Exhibit 19

```
 1              UNITED STATES DISTRICT COURT

 2          FOR THE EASTERN DISTRICT OF TEXAS

 3                  MARSHALL DIVISION

 4

 5    HEADWATER RESEARCH, LLC,        )

                                      )

 6           PLAINTIFF,               )

                                      )

 7             VS.                    ) Case No.

                                      ) 2:22-CV-00422-JRG-RSP

 8    SAMSUNG ELECTRONICS CO.,        )

      LTD., SAMSUNG ELECTRONICS       )

 9    AMERICA, INC.,                  )

                                      )

10           DEFENDANTS.              )

      _____)

11

12

13

14         VIDEOTAPED DEPOSITION OF JEFF SHARKEY

15    ███████████████████████████████████████████

16         ████████████████████████████

17      TUESDAY, JANUARY 23, 2024, 9:12 A.M.

18          VIA VIDEOCONFERENCE (ZOOM)

19

20

21

22

23   Reported by Desiree Cooks, CSR No. 14075

24   Job No. 6428176

25   Pages 1 - 243
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 2      ALL APPEARING VIA VIDEOCONFERENCE (ZOOM)
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20
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22           Tony Nokes, Videographer
23           Jared Hartzman
24           Jon Hyland
25
```

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 8    BY MR. YANG                                      231

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12                        PAGE      LINE

13                          (NONE)

14

15                     DOCUMENTS REQUESTED

16                        PAGE      LINE

17                          (NONE)

18

19              WITNESS INSTRUCTED NOT TO ANSWER

20                        PAGE      LINE

21                          (NONE)

22

23

24

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24                      Eyes Only)

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1   TUESDAY, JANUARY 23, 2024, 9:12 A.M.

2   VIA VIDEOCONFERENCE (ZOOM)

3

4   THE VIDEOGRAPHER: Good morning. We are going

5   on the record at 9:12 a.m. Mountain Time, on

6   January 22nd -- sorry -- January 23rd, 2024.

7   Please note that this deposition is being

8   conducted virtually. Quality of recording depends on the

9   quality of camera and internet connection of

10   participants.

11   What is seen and heard from the witness on

12   screen is what will be recorded. Audio and video

13   recording will continue to take place unless all parties

14   agree to go off the record.

15   This is Media Unit 1 of the video-recorded

16   deposition of Jeff Sharkey, Google corp. rep, taken by

17   counsel for the defendant in the matter of Headwater

18   Research LLC vs. Samsung Electronics Co., Ltd., et al.,

19   filed in the United States District Court for the Eastern

20   District of Texas, Marshall Division, Case Number:

21   2:23-cv-00103-JRG-RSP.

22   This deposition is being conducted remotely.

23   The video is appearing from Boulder, Colorado.

24   My name is Tony Nokes. I am the videographer.

25   The court reporter is Desiree Cooks. We're here from the

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1   firm Veritext Legal Solutions. I am not related to any

2   party in this action, nor am I financially interested in

3   the outcome.

4   If there are any objections to proceeding,

5   please state them at the time of your appearances.

6   Counsel and all present will now state their

7   objections -- I'm sorry.

8   I am not financially interested in the outcome.

9   If there are any objections to proceeding, please state

10   them at the time of your appearance.

11   Counsel and all present will now state their

12   appearance and affiliations for the record, beginning

13   with the noticing attorney.

14   MR. SCHMIDT: Good morning. My name is

15   Grant Schmidt. I have Mr. Theo Kwong, my partner, in the

16   room with me, as well as my partner, Jon Hyland. We are

17   here on behalf of the Samsung entities.

18   And I just wanted to make one clarification,

19   Mr. Nokes. I believe the right case number for this

20   particular matter, and Reza can correct me if I'm wrong,

21   is 2:22-cv-422. There are several Headwater-Samsung

22   matters, so I just want to make sure we have the right

23   matter in the record.

24   THE VIDEOGRAPHER: Thank you.

25   Other attorneys, please.

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1   MR. MIRZAIE: Yes. This is Reza Mirzaie from

2   Russ August & Kabat, representing Headwater. We also

3   served several subpoenas, so we'll be asking questions as

4   well.

5   With me on this line is my colleague,

6   Jason Wietholter, also of Russ August & Kabat.

7   MR. YANG: Lance Yang from Quinn Emanuel on

8   behalf of Google, third-party Google, and Mr. Sharkey.

9   And with me also I have Howard Chen of Google.

10   THE VIDEOGRAPHER: Thank you.

11   We may proceed. Will the court reporter please

12   swear in the witness.

13   JEFFREY SHARKEY,

14   having been first duly sworn, testifies as follows:

15

16   MR. SCHMIDT: Thank you.

17   And before we begin, I just wanted to state on

18   the record that Reza and I have been communicating

19   leading up to this deposition, and we have been able to

20   reach a joint stipulation as to authenticity of documents

21   produced by Google thus far, as well as documents

22   obtained from Google's website, as well as a YouTube

23   video called "Coding For Life -- Battery Life, That is"

24   that we will be discussing today.

25   ///

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```
 1                        EXAMINATION

 2      BY MR. SCHMIDT:

 3           Q      Good morning, Mr. Sharkey.

 4           A      Good morning.

 5           Q      Could you please state your name for the

 6      record.

 7           A      My name is Jeffrey Allen Sharkey.

 8           Q      Mr. Sharkey, what do you do for a living?

 9           A      I am a software engineer.

10           Q      Who is your employer?

11           A      Google.

12           Q      How long have you worked for Google?

13           A      I joined Google in December of 2008.

14           Q      What is your current title at Google?

15           A      I believe it is senior staff -- senior staff

16      software engineer.

17           Q      You understand, Mr. Sharkey, of course, that

18      you are giving sworn testimony under oath.

19                  Is that fair?

20           A      Yes.

21           Q      Just as if the jury or the judge was in the

22      room with us; right?

23           A      Yes.

24           Q      Are you here to testify on behalf of both

25      Google, the entity, as well as you individually?
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 1        A       That is my understanding, yes.

 2        Q       And, Mr. Sharkey, is there any reason that you

 3   cannot testify truthfully and accurately today?

 4        A       No reason.

 5        Q       Have you ever been deposed before?

 6        A       No, sir.

 7        Q       I'm going to go over some very high-level

 8   ground rules.  I know your attorneys are excellent and

 9   have likely gone over some of these things with you.

10            But if you don't understand one of my

11   questions -- I will do my best to speak clearly and

12   slowly, but if you do not understand one of my questions,

13   will you let me know?

14        A       Yes.

15        Q       This is a marathon.  It's going to be a long

16   day.  I'm going to be hopefully relatively quick, but I

17   want you to be able to take breaks when you want to take

18   breaks.

19            So will you let me know if at any juncture

20   you'd like to pump the brakes and take a few moments?

21        A       I will let you know.

22        Q       I just ask that you not take a break -- or not

23   ask to take a break when a question is pending.

24            Is that fair?

25        A       Yes.
```

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1   Q   The court reporter, Ms. Cooks, is working hard

2   today and will be taking down every word that we say, and

3   so I just ask that you let me finish my question, and I

4   will absolutely not interrupt you and let you finish your

5   answer.

6   Is that fair?

7   A   Yes.

8   Q   The other thing to remember is that any answer

9   such as "mh-hm" or shaking of head is very hard for

10   Ms. Cooks to capture, so I just ask that you give oral

11   answers to my questions.

12   Is that fair?

13   A   Yes. I understand.

14   Q   Mr. Sharkey, I want to very quickly touch on

15   your educational background.

16   Where did you go to college?

17   A   I attended the University of Minnesota Duluth

18   for my undergraduate degree and the Univer- -- the

19   Montana State University for my master's.

20   Q   So at University of Minnesota Duluth, what was

21   your degree and what was it in?

22   A   Computer science, so bachelor of science.

23   Q   And then did you mention you had your master's

24   from Montana State?

25   A   Yes, that's correct. Also in computer science.

Page 12

1   Q   Very good. When you started work for Google in

2   December 2008, what was your title?

3   A   I believe it was software engineer perhaps

4   Level 2 or Level 3.

5   Q   Can you describe to us how you ultimately got

6   to Google as your employer?

7   A   I participated in the Android Developer

8   Challenge, an external contest where I wrote an

9   application -- an Android application, which succeeded in

10   being one of the winners of that contest. And I believe

11   that it gave me an opportunity to interact with several

12   Google engineers on the Android team, and that

13   potentially became the pathway for my employment.

14   Q   So therefore, prior to December 2008, you

15   already had time working with Android and spending some

16   time understanding the technology.

17   Is that fair?

18   A   That's correct, yes.

19   Q   Did you, in fact, win the Android Developer

20   Challenge?

21   A   I believe there were ten winners identified.

22   There were no rankings within that ten, and I was one of

23   the final ten winners, I believe.

24   (Reporter clarification.)

25   THE WITNESS: Can you repeat the question?

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1   (The record was read back as follows:

2   "Question: Did you, in fact, win

3   the Android Developer Challenge?")

4   THE WITNESS: The Android Developer Challenge,

5   I believe, had ten winners with no ranking identified

6   between them, and I was one of the final ten, those

7   identified as winner.

8   BY MR. SCHMIDT:

9   Q   Very good.

10   MR. SCHMIDT: And is Mr. Sharkey's camera

11   frozen to everybody else?

12   Oh, there we go. Now I can see him. Very

13   good.

14   BY MR. SCHMIDT:

15   Q   Mr. Sharkey, can you describe at a very high

16   level your submission within the Android Developer

17   Challenge?

18   A   Yes. The application would use the camera of

19   the device to recognize a barcode and offer the user

20   information about where they could obtain that item and

21   different prices associated with it.

22   Q   When you first started, December 2008, did you

23   have a particular area of focus as a Google software

24   engineer?

25   A   No, I did not. Just to clarify, I was assigned

Page 14

1   to the Android team, but within the Android team, I did

2   not have a specific area of focus.

3   Q   Early in your career at Google, did you have

4   certain focuses on apps and issues surrounding app

5   widgets, for example?

6   A   Yes. As part of my role as an Android

7   developer on the platform, we often work closely and are

8   aware of how developers interact with the platform and

9   the APIs that we build and provide.

10   Q   What about the power efficiencies of those app

11   widgets? Was that something that you worked on towards

12   the early part of your career?

13   A   Yes, it is. App widgets was one of the first

14   projects that I was assigned to. And yes, power and --

15   power usage on the device was a primary awareness of

16   ours, as we developed that feature.

17   Q   I want to shift focuses -- I want to shift the

18   focus to some questions about a presentation you gave 15

19   years ago. I know you've slept since then, so hang with

20   me.

21   Do you recall giving a presentation on

22   May 27th, 2009, titled "Coding For Life -- Battery Life,

23   That Is"?

24   A   Yes, I recall.

25   Q   Where were you when you gave that presentation?

Page 15

1   A   I was in Moscone Center in San Francisco,

2   California.

3   Q   Who was in attendance when you gave that

4   presentation?

5   A   Many Android and other developers interested in

6   Google technologies.

7   Q   Were there third-party developers present?

8   A   Yes. They were the primary audience.

9   Q   Approximately how many people were in

10   attendance, if you recall?

11   A   I believe the room held at least 100 people.

12   Q   Do you recall the room being full?

13   A   I do. I recall people being turned away

14   because the room was beyond capacity.

15   Q   Was this part of an annual conference that

16   Google hosts?

17   A   Yes, it is.

18   MR. SCHMIDT: I'm going to share my screen here

19   with what will be marked as Exhibit 1, which is --

20   (Audio distortion.)

21   (Reporter clarification.)

22   MR. SCHMIDT: I am now sharing my screen, which

23   captures what will be marked Exhibit 1, which Bates

24   number is GOOG-HEADWATER-92.

25   (Exhibit 1 marked.)

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1   MR. YANG: Counsel, just for everyone's

2   awareness, Mr. Sharkey has hard copies -- clean, unmarked

3   hard copies of all of the productions that was submitted

4   in this case. So if you would like him to -- if he

5   prefers, he can also look at the hard copy.

6   MR. SCHMIDT: Perfect.

7   BY MR. SCHMIDT:

8   Q   Mr. Sharkey, whatever is best for you. What I

9   might do is just use my share screen to direct you to the

10   right spot, if it's helpful, and then you can look at the

11   hard copy if that's easier for you to maneuver.

12   Does that sound okay?

13   A   Yes, it does. I'll gladly follow you on the

14   screen.

15   Q   Okay. Very good.

16   So, Mr. Sharkey, I'm sharing on my screen what

17   has been marked as Exhibit 1. I'm going to go to the

18   second page of Exhibit 1.

19   Do you recognize this document?

20   A   I do, yes.

21   Q   What is it?

22   A   This is a printout of the slide deck that I

23   presented.

24   Q   And just to be clear, this is the slide deck

25   that you presented on May 27th, 2009, at the conference

                                                    Page 17

1   we were just discussing?

2   A   Yes, sir.

3   MR. SCHMIDT: I am now -- just so we're all on

4   the same page, I am also going to share my screen with

5   what will be marked as Exhibit 2.

6   One second.

7   (Exhibit 2 marked.)

8   BY MR. SCHMIDT:

9   Q   Mr. Sharkey, can you see my screen now?

10   A   Yes, I can.

11   Q   Okay. I'm going to play the first just ten

12   seconds of this video, and then I'm going to stop.

13   Okay?

14   A   Understood.

15   (Video played.)

16   BY MR. SCHMIDT:

17   Q   Mr. Sharkey, could you hear your voice in that

18   video?

19   A   Yes, I could.

20   Q   Okay. And I'm going to go just to the

21   30-second spot and play just a couple more seconds of it.

22   (Video played.)

23   BY MR. SCHMIDT:

24   Q   And do you recognize that individual in the

25   video?

Page 18

1   A   I do.

2   Q   Is that you?

3   A   Yes, sir, it is.

4   Q   Okay. Very good.

5   Now, let me ask you, these presentations that

6   are given at these annual conferences, are they typically

7   recorded?

8   A   Yes, they are.

9   Q   And why does Google traditionally record --

10 strike that.

11   Why does Google record these presentations?

12   A   So that they can be made broadly available to

13 the widest possible audience.

14   MR. SCHMIDT: All right. Very good.

15   I'm going to share my screen one more time with

16 what will be marked as Exhibit 3.

17   (Exhibit 3 marked.)

18 BY MR. SCHMIDT:

19   Q   Can you see my screen, Mr. Sharkey?

20   A   Yes, I can.

21   Q   Okay. I'll represent to you this is a -- this

22 is simply a screenshot of the YouTube page where this

23 presentation -- you can see "Coding For Life -- Battery

24 Life, That Is," is captured.

25   Are you with me?

Page 19

1   A   Yes, I am.

2   Q   Do you recognize the YouTube provider here,

3   which is Google for Developers?

4   A   Yes, I do.

5   Q   Can you just very briefly describe for me what

6   is that YouTube channel, for example, or provider used

7   for?

8   A   It's primarily used to -- for Google to

9   communicate with developers that are interested in its

10   technologies.

11   Q   And so after -- so after these types of

12   presentations for developers are recorded, are they

13   typically uploaded to the Google for Developers YouTube

14   channel?

15   A   Yes, they are.

16   Q   And then do you see the date next to the number

17   of views, which this has been viewed over 73,000 times.

18   Do you see that?

19   A   I do.

20   Q   And then you see June 2nd, 2009.

21   Is that fair?

22   A   I do see that on the screen.

23   Q   And so was this video uploaded a few days after

24   your May 27th presentation?

25   A   That would be my best explanation.

Page 20

1   Q   I want to ask you one more question about this

2   conference.

3   Just at a high level, can you describe for me

4   the Google I/O conference, what is that, and what does

5   I/O signify.

6   A   The conference was intended to invite

7   developers in person to be able to not just listen to

8   presentations, but to be able to ask questions of the

9   technical team.

10   And can you repeat the second part of your

11   question?

12   Q   I was curious what the I/O nomenclature

13   symbolized or represented?

14   A   My best understanding of that is it references

15   a general concept in computer science known as

16   input/output, a two-way conversation. So it's intended

17   to relate to developers in some -- in a way that they

18   would recognize.

19   Q   Mr. Sharkey, how frequently do you present to

20   third-party developers?

21   A   It's varied over the course of my career.

22   Approximately half a dozen times in public settings.

23   Q   Before -- I'm going to take this down for just

24   a second.

25   Before we dive into that presentation that you

Page 21

```
 1    gave in May 2009, I want to ask you, for my own benefit

 2    and for the jury's benefit, a few basic questions about

 3    information provided to developers.

 4              When we are talking about an operating system

 5    on a cell phone, what does that operating system

 6    typically include, at a very high level?

 7         A    At a high level, it includes the instructions

 8    necessary to run the device, to make it functional.

 9         Q    And are those instructions found in the source

10    code via that operating system?

11         A    The source code is typically compiled into an

12    efficient representation, but yes, the source code is the

13    beginning of what gets put on the devices to run.

14         Q    And so does Google make operating systems for

15    cell phones?

16         A    Yes, they do.

17         Q    What is Google's operating system called?

18         A    Android, for cell phones.

19              (Reporter clarification.)

20              THE WITNESS:  For cell phones.

21    BY MR. SCHMIDT:

22         Q    I'm just going to ask that question just so

23    it's clean.

24              Mr. Sharkey, what is the Google operating

25    system called that is used on cell phones?
```

Page 22

1   A   Android.

2   Q   You mentioned earlier that the source code is

3   compiled -- the source code that is in effect become --

4   that does in effect become instructions.

5   What is it called once the source code is

6   compiled or packaged up?

7   A   The typical term for that is a binary.

8   Q   What is an API -- let me first ask this: What

9   is an API?

10   A   I believe it stands for application programming

11   interface.

12   Q   Is that a -- is that another method for

13   packaging that source code?

14   A   No.

15   Q   Okay. What --

16   A   It's -- yeah, it's -- could you maybe ask your

17   question in a different way?

18   Q   Yes, absolutely.

19   What is the function of the application program

20   interface or the API?

21   A   It's to give a consistent published way for

22   developers to interact with the operating system.

23   Q   And then what about an SDK, a software

24   development kit?

25   Are you familiar with that?

Page 23

1   A   Yes.

2   Q   What is the function of the software

3   development kit?

4   A   It's typically to give all of the tools

5   necessary for a developer to create an application.

6   Q   Very good.

7   So at a very high level, for someone who might

8   have limited knowledge about how these SDKs or APIs work,

9   what can these third-party developers do once they

10   receive an API or SDK from Google?

11   A   They can begin writing an application, which

12   then they can upload later to publish for other users to

13   install.

14   Q   I am now going to return to the presentation

15   that you provided in 2009.

16   Can you see my screen again?

17   A   I can.

18   Q   All right. I'm sharing Exhibit 1. Again, this

19   is the deck that captures your presentation.

20   Let me ask you this, Mr. Sharkey, just so we're

21   on the same page: During this presentation, did you

22   discuss certain tools that the API and SDKs could provide

23   for developers?

24   A   Yes, I did.

25   Q   Now, the title of your deck includes the word

Page 24

1   "coding."

2   Do you see that?

3   A   I do.

4   Q   And so in 2009, when you gave this

5   presentation, did Google provide software code to

6   third-party developers?

7   A   They provided the Android SDK, yes.

8   (Reporter clarification.)

9   THE WITNESS: Android SDK, yes.

10   BY MR. SCHMIDT:

11   Q   Mr. Sharkey, can you describe for me and the

12   jury what was the subject matter of your presentation.

13   A   The subject matter was presenting

14   recommendations, best practices of how developers would

15   recommend they write apps so that they run efficiently.

16   Q   Did you describe various tools that the

17   developers can use throughout this presentation?

18   A   Yes, I did.

19   Q   Were those tools that you described available

20   at the time of your -- at least at the time of your

21   presentation?

22   A   Yes, they were.

23   Q   Now, in terms of battery life, what were you

24   describing -- again, I'm still at a very high level.

25   We'll dig deep in just a second.

Page 25

1   But in terms of battery life, what types of

2   tools were you providing these developers that would

3   affect battery life?

4   A   Broadly mechanisms to avoid doing expensive

5   work or expensive operations.

6   Q   And just to be clear, when we talk about these

7   third-party developers, are these individuals who are

8   constructing apps on your phone such as Instagram, ESPN,

9   Spotify, things of that nature?

10   A   That's an accurate description, yes.

11   Q   One more level-set question.

12   What experience -- at this juncture, May 2009,

13   Mr. Sharkey, what experience did you have at this time

14   that justified you being the ambassador for Google on

15   this topic?

16   A   I would say it was both having -- being a

17   third-party developer, somebody that had built an

18   application, and as an engineer on the Android team where

19   I could observe best practices internally.

20   Q   At the time of your presentation, May 2009,

21   what was the current version of Android, which as we said

22   earlier, is Google's operating system for cell phone.

23   What was the current version of Android that

24   was available?

25   A   I believe what we made available around that

Page 26

1   time was Cupcake, or Android 1.5.

2   Q   And so is "Cupcake" a nickname, if you will,

3   for Version 1.5?

4   A   Yes, it is.

5   Q   And as far as you can recall, when was Version

6   1.5 or Cupcake first released?

7   A   I don't have -- I don't recall an exact date.

8   I know that it was available to the developers at the

9   moment that I gave this presentation.

10   Q   So it would have been made available at least

11   by May 27th, 2009.

12   Is that fair?

13   A   That's accurate, yes.

14   Q   I'm going to go to Page 6.

15   Do you see the title of this slide? It says,

16   "What costs the most?"

17   A   I do.

18   Q   And then we see the very first bullet point:

19   "Waking up in the background when the phone would

20   otherwise be sleeping."

21   Do you see that?

22   A   Yes.

23   Q   So when you reference costs in the context of

24   battery life, what are you -- what are you saying? What

25   are you referencing?

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1   Strike that, Mr. Sharkey.

2   Let me ask it this way: What are some of the

3   costs that we are discussing in the context of battery

4   life?

5   A   In this case, it can be using the CPU to

6   process data. It can also be using the network to upload

7   or download data.

8   Q   And in this reference to waking up in the

9   background when the phone would otherwise be sleeping,

10   what is it that you're describing as potentially waking

11   up in the background?

12   A   An example would be an email client checking to

13   see if there are new emails for the user.

14   Q   And that could be -- it could also be other

15   mobile applications on someone's phone that is waking up

16   in the background.

17   Is that fair?

18   A   Yes.

19   Q   Okay. So let me ask it this way: In addition

20   to what you just offered, what are some of the other

21   items that could be waking up in the background of the

22   cell phone?

23   A   Typically it involves fetching some sort of

24   remote data from the internet, so email, as an example,

25   checking to see the latest sports scores.

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1   Q   Very good. That's helpful.

2   So just, again, for someone who might not have

3   expertise on this topic, why do -- why does the act of

4   background applications waking up the mobile device cost

5   the most battery life?

6   A   When the device is not being used, it's in a

7   low-power state, which can -- which means the battery can

8   last -- last a longer period of time. Anything that

9   causes a device to wake up and process data consumes

10   battery at a faster rate.

11   Q   And so at least at this time, May 2009,

12   Mr. Sharkey, did Google's Android provide tools to

13   developers to help preserve battery life?

14   A   Yes, they did.

15   Q   Was preventing applications from running in the

16   background one of the tools Android provided for purposes

17   of preserving battery life?

18   MR. MIRZAIE: Objection. Form.

19   MR. YANG: You could still answer the question.

20   BY MR. SCHMIDT:

21   Q   Let me ask that again, Mr. Sharkey.

22   Was preventing applications from running in the

23   background one of the tools that Android provided for

24   purposes of preserving battery life?

25   MR. MIRZAIE: Objection. Form.

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1   THE WITNESS: The Android operating system gave

2   enough signals for an application to know if they were

3   running in the background or the foreground, and so it

4   gave them the opportunity to adjust their behavior.

5   BY MR. SCHMIDT:

6   Q   And in that context, what are some of the

7   steps -- what are some of the result -- strike that.

8   In that context, what's an example of a way

9   that a user could adjust its behavior based on that

10   information or based on those tools?

11   A   Just to clarify, the user there being the end

12   user of the physical device?

13   Q   Yes, sir.

14   A   So one example in Cupcake, in the settings

15   application, there was a checkbox that allowed the user

16   to indicate that they desired -- that background data be

17   restricted. They would request applications to not use

18   background data.

19   (Reporter clarification.)

20   THE WITNESS: In the settings application,

21   there was a way for users to express a desire that they

22   wanted -- that they did not want applications to use data

23   in the background.

24   BY MR. SCHMIDT:

25   Q   I'm going to move to Slide 7, and this is the

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```
 1    page ending with the Bates Number 98.

 2              Mr. Sharkey, the presentation you provided, in

 3    addition to discussing costs, discusses bulk data

 4    transfers.

 5              Do you see that?

 6         A    I do.

 7         Q    And then under the bulk data transfers, it

 8    lists EDGE, 3G, and Wi-Fi.

 9              Do you see that?

10         A    Yes.

11         Q    What is EDGE in this context?

12         A    EDGE is a relatively slow and old mechanism

13    that supports wireless data transfer.

14         Q    And what is 3G?

15         A    3G at the time of this presentation was a more

16    modern, faster way of accomplishing the same;

17    transferring mobile data.

18         Q    Are both EDGE and 3G considered mobile

19    connections?

20         A    Yes, they are.

21         Q    When we -- and, again, I think most people

22    know, but just for the benefit of everyone, what is

23    Wi-Fi?

24         A    Wi-Fi is typically an unmanaged network that

25    someone may run in their office or home, which is a much
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1   smaller scale.

2   Q   Between 3G and Wi-Fi, when we're comparing

3   those two, which bulk data transfers cost more battery

4   life?

5   A   Based on the information on the slide in front

6   of me, the measurements at this time using the Wi-Fi

7   radio was more expensive for battery life.

8   Q   Let me ask you about that.

9   So if I'm comparing 3G to Wi-Fi at a high

10   level, what does the comparison between 9.5 and 4.4 mean

11   to someone who might not have experience in this area?

12   A   The units of milliamp hours are indicating how

13   much battery total was consumed to accomplish a goal of

14   transferring a single six-megabyte song.

15   Q   So in that instance, would a 3G connection cost

16   more battery life than Wi-Fi?

17   A   When establishing the same task of transferring

18   that six-megabyte song, yes, 3G would be more expensive

19   than Wi-Fi.

20   Q   And why is that?

21   A   Because the data connection is slower, so even

22   though the speed or -- or the rate of power usage appears

23   cheaper or lower for 3G, it takes longer. There's a

24   longer duration required to run the radio to accomplish

25   the task.

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1   Q   So the context of describing the tools that

2   Android provided developers.

3   Was the ability to allow a data transfer over a

4   Wi-Fi network but not cellular network one of those

5   tools?

6   MR. MIRZAIE: Objection. Form.

7   THE WITNESS: The Android operating system

8   provided APIs to -- for developers to detect the current

9   network connection and what type it was.

10 BY MR. SCHMIDT:

11   Q   And is that an example then where the developer

12 could use those tools to effectuate that battery life,

13 for example?

14   MR. MIRZAIE: Objection. Form.

15   THE WITNESS: Yes, it is.

16   My answer was yes, it is.

17 BY MR. SCHMIDT:

18   Q   I'm going to go to Slide 10, which ends in

19 Bates Number 101.

20   And you see, Mr. Sharkey, here at the top it

21 says, "How can we do better?"

22   Is that fair?

23   A   I see that, yes.

24   Q   And do you see a reference to

25 ConnectivityManager.TYPE?

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1   Do you see that?

2   A   I do.

3   Q   Okay. What is ConnectivityManager in this

4   context?

5   A   ConnectivityManager is a collection of APIs

6   that a developer can interact with to understand the

7   network connections on the device.

8   Q   And so you -- I'm going to read a line from the

9   transcript of the video, and I want to ask you about it.

10   You said, "Something that you can do as a

11   developer is you can check the current network connection

12   that the user is on -- that the device is on.

13   "So, for example, if you know you need to

14   download a lot of data, maybe you'll hold off on that

15   transfer until the user comes into an area with 3G

16   coverage or they connect to a Wi-Fi network."

17   Does that sound accurate?

18   A   It sounds accurate. I don't recall if I used

19   those exact words.

20   Q   With that background, can you just describe at

21   a high level the tools that the Android was providing in

22   the context of the ConnectivityManager API?

23   A   With that context, a developer can check to see

24   the current network connection that is active before they

25   attempt to perform a transfer.

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1   Q   And when we were talking about the type of

2   connection, that brings us back to our prior discussion

3   about EDGE -- strike that.

4   Let me ask it this way: Just so we're on the

5   same page, what is a type of -- what is an example of a

6   type of connection?

7   A   Yeah, we see two of them on this slide,

8   TYPE_WIFI and TYPE_MOBILE, so they're flavors of the --

9   the type of connection that's available.

10   Q   I want to get to the TYPE_WIFI and TYPE_MOBILE

11   in just a second. Before we get there, do you see the

12   slide that says, "Only update if Wi-Fi or 3G is connected

13   and not roaming"?

14   Do you see that?

15   A   Yes.

16   Q   What does that mean?

17   A   That's a summary of the computer code that

18   follows it, a summary of what it's intending to do.

19   Q   And in this instance, what is it intending to

20   do?

21   A   It's intending to only transfer -- only perform

22   a network transfer when a relatively cheap connection or,

23   like -- is available and active on the device.

24   Q   You mentioned earlier the TYPE_WIFI reference.

25   Do you see that?

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1   A   Yes.

2   Q   In this instance, what is the difference

3   between TYPE_WIFI and TYPE_MOBILE?

4   A   As we mentioned earlier, TYPE_WIFI is typically

5   a local network managed out of someone's home or office.

6   And TYPE_MOBILE would typically be a cellular carrier

7   such as AT&T or Verizon, which is available over a much

8   wider area.

9   Q   Just so everyone is on the same page, when

10   we're talking about Wi-Fi, is that a type of wireless

11   local area network?

12   A   Yes, it is.

13   Q   And so according to this code that's in your

14   May 2009 presentation, if the network tag is TYPE_WIFI,

15   would the code return a result of, quote, "info is

16   connected"?

17   A   Yes, it would.

18   Q   And what does that mean?

19   A   The reason we -- we additionally check the "is

20   connected" is you may be nearing Wi-Fi connection, but it

21   may not be active, so we check -- we're saying return is

22   connected if, yes, we have a connection to a Wi-Fi

23   network and it's actively connected.

24   An example there might be if we're still in the

25   process of negotiating our connection is -- would be an

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1   example of when we're not fully connected yet.

2   Q   What about in the context of TYPE_MOBILE? What

3   would happen -- or what does this code anticipate

4   happening with TYPE_MOBILE?

5   A   So it's looking at the primary type if we're

6   connected to a mobile network. And then it's

7   additionally checking those two other conditions and

8   requiring that those also be true.

9   Q   Mr. Sharkey, what is the impact of these tools

10   of this code on battery life for a cell phone?

11   MR. MIRZAIE: Objection. Form.

12   BY MR. SCHMIDT:

13   Q   Strike that.

14   Let me ask it this way: Mr. Sharkey, does this

15   code -- does this type of code have an impact on battery

16   life on a cell phone?

17   MR. MIRZAIE: Objection. Form.

18   BY MR. SCHMIDT:

19   Q   You can answer.

20   A   Yes. It does. It would improve it.

21   Q   And how would it -- how would this code improve

22   battery life in this context?

23   A   It would defer operations that are expensive

24   until a later time when a faster network became

25   available.

1   Q   What happens in this context -- I'm almost done

2   with this slide.   Hang with me.

3   What happens in this context if the network

4   type is TYPE_MOBILE and then the subtype is TYPE_UMTS?

5   A   So in that case, it is -- UMTS is referring to

6   the 3G technology, so if we're on a 3G network, and

7   additionally, if we're not roaming, then it will return.

8   And if we are actually connected to that network, it will

9   return true.

10   Q   Back in 2009, did Android provide tools for

11   developers to check whether a device was on Wi-Fi versus

12   a cellular connection?

13   A   Yes, it did.

14   Q   And, again, just so we're on the same page,

15   what are the benefits of Wi-Fi -- strike that.

16   Let me ask it this way: What are the benefits

17   of Wi-Fi over cellular connection?

18   A   Wi-Fi connections are typically faster so they

19   can accomplish a task in less time using less battery.

20   Q   Back in 2009, did Android provide developers

21   the tools to use that classification that you just

22   described, Wi-Fi versus cellular, to determine whether a

23   data transfer should occur?

24   MR. MIRZAIE: Objection.   Form.

25   THE WITNESS: Yes.   Android provided these APIs

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1   for developers to call.

2   BY MR. SCHMIDT:

3   Q   Mr. Sharkey, what does it mean to be metered

4   versus unmetered?

5   A   Metered is a concept that we've used to

6   indicate the user may be sensitive to the financial cost

7   of using data on a connection.

8   Q   Did the Android -- at the time of this

9   presentation, 2009, did Android allow users to check if a

10   cellular collection (as said) was metered or unmetered?

11   A   To the best of my knowledge, the Android

12   operating system did not contain the concept of metered

13   or unmetered as of the Cupcake release.

14   Q   When did the metered or unmetered tool --

15   strike that.

16   Let me ask it this way: When did the factor of

17   metered or unmetered start playing a role in the Android

18   operating system, if you remember?

19   A   I believe we may have introduced an API related

20   to that in the Ice Cream Sandwich release.

21   Q   And when was that?

22   A   I'd have to examine -- I'd have to look closer

23   at documents. I don't recall the exact dates.

24   Q   No problem.

25   All right. I am moving to Slide 15 of

Page 39

1   Exhibit 1. And do you see here -- it says, "How can we

2   do better? Foreground apps."

3   Do you see that?

4   A   Yes.

5   Q   At a very high level, what are we referencing

6   when we talk about foreground apps versus background

7   apps?

8   A   At a high level, a foreground app is something

9   that the user is actively aware is operating and that

10   they're interacting with.

11   Q   And what about the background app?

12   A   I would say it's the negation of that.

13   Q   In this context, are we talking about -- strike

14   that.

15   Let me ask it this way: What are we -- in this

16   context, are we discussing foreground and background apps

17   in the context of preserving battery life?

18   A   When we discuss background apps, yes.

19   Q   And at least by the time of this presentation,

20   May 2009, did Android give developers the tools to

21   determine if an app was in the foreground or background?

22   MR. MIRZAIE: Objection. Form.

23   THE WITNESS: The tools were there for an app

24   to be able to determine if they were running in the

25   foreground or not.

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1   BY MR. SCHMIDT:

2   Q   Let me ask it this way as well -- thank you.

3   That's helpful. Let me ask it one more way.

4   At a high level -- we are about to dig into

5   them.

6   At a high level, what are some of the tools

7   that Android gave developers in the context of assessing

8   foreground and background apps?

9   MR. MIRZAIE: Objection. Form.

10   THE WITNESS: So an Android application can

11   have broad -- broadly four types of components or code

12   running inside of it, one of which is an activity, which

13   is a very popular -- one of those mechanisms.

14   As part of the activity running, there's a life

15   cycle where the operating system tells the application

16   what state the activity is in. And so that is the

17   mechanism by which an application could determine.

18   If they have a foreground activity, that would

19   be a way. If there's a resumed activity, the application

20   would know that it is running in the foreground.

21   BY MR. SCHMIDT:

22   Q   What is the effect -- again, we're about to get

23   into the details. But what is the effect, at a high

24   level, of the distinction between foreground and

25   background apps on battery life?

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1   A   I would say we advised developers to be aware

2   of their usage in the background because -- because it

3   can add up without the user being aware of it.

4   Q   All right. So we're going to go to Slide 27,

5   still on Exhibit 1.

6   Do you see at the top, Mr. Sharkey, it says,

7   "How can we do better? Background apps"?

8   Do you see that?

9   A   Yes.

10   Q   And then it says, "Checking current battery and

11   network state before running a full update."

12   Do you see that?

13   A   Yes.

14   Q   What did you mean by that, "checking current

15   battery and network state before running a full update"?

16   A   If I recall, the intention in sharing this code

17   snippet was to enable developers to check the current

18   battery level. And so if the battery was running low,

19   they may choose to skip or pause updates until it had

20   been recharged at a later time.

21   Q   I'm going to go up real quick to Slide 25 of

22   the same document, Exhibit 1.

23   Mr. Sharkey, during your presentation, you

24   talked about changes with the network connection, for

25   example, switching from EDGE to Wi-Fi.

1   How would a change in network connection be

2   used in the context of background applications to

3   preserve battery?

4   MR. MIRZAIE: Objection. Form.

5   THE WITNESS: One example, when a transfer

6   began, we may actively have a fast network connection

7   like Wi-Fi. But if the user walks out of range, the

8   device may switch to a much slower network, and we want

9   to give the developer an opportunity to pause that

10   transfer instead of accidently continuing it on an

11   expensive connection.

12   BY MR. SCHMIDT:

13   Q   In your presentation, you say -- again, I know

14   you don't have the transcript in front of you.

15   You say, "If you're doing some background

16   tasks, you might fall asleep during this period and wake

17   yourself up maybe a day later and you might have more

18   battery, so you could use that to cancel some background

19   tasks."

20   Does that make sense?

21   A   Yeah. Yes.

22   Q   Could you educate me a little bit on that and

23   explain what you meant in the context of these background

24   apps?

25   A   An application may receive, for example, the

                                             Page 43

1   battery low broadcast, which would indicate the device is

2   running low. If the application had active work, they

3   may choose to stop that and then at a later time, another

4   broadcast may wake them up.

5   And if they check the battery, they may now

6   discover that there's -- the battery has been charged,

7   and they may choose to resume their transfer.

8   Q   Also during your presentation, you mention

9   something about background applications like, for

10   example, YouTube receiving updates about changing between

11   EDGE and Wi-Fi.

12   Why did background apps receive updates about

13   the change in network?

14   MR. MIRZAIE: Objection. Form.

15   THE WITNESS: The operating system would tell

16   them about network changes so that they could make

17   adjustments to ongoing tasks that they were doing.

18   BY MR. SCHMIDT:

19   Q   Are there examples, Mr. Sharkey, where an

20   application does want to be woken up for a connectivity

21   change?

22   A   Yes, there are many examples.

23   Q   Could you give me just one or two?

24   A   One would be an email application. If you

25   imagine you take a flight and you're in airplane mode,

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1   when you arrive at your destination and leave airplane

2   mode, that email application would likely desire to know

3   that you now have a network connection so it can retrieve

4   new messages.

5   Q   Can it be the case that a background app like

6   YouTube is waiting for a connectivity change, for

7   example, from mobile to Wi-Fi before it performs a

8   service?

9   A   Yes.

10   MR. MIRZAIE: Objection. Form.

11   THE WITNESS: My answer was yes.

12   BY MR. SCHMIDT:

13   Q   Why is that? Why would a background app like

14   YouTube wait for a connectivity change before it does

15   something?

16   A   To be a better citizen or better user of the

17   device, to avoid costing the user additional battery or

18   additional data usage.

19   Q   Back in 2009 could a user change whether an

20   Android phone used background data?

21   MR. MIRZAIE: Objection. Form.

22   THE WITNESS: As I mentioned earlier, I believe

23   the settings app had a toggle where the user could

24   express their desire for -- for applications on the

25   device to defer or not to perform background work --

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1   background data.

2   BY MR. SCHMIDT:

3   Q   One more question on the slides here.

4   There's a reference in the deck to get

5   background data setting.

6   Does that sound familiar?

7   A   Yes, it does.

8   Q   What does that mean?

9   A   That -- directly that is the API where we

10   surface to developers what I just -- what I had just

11   described a few moments earlier, the setting the user

12   changes in the -- in the settings application.

13   When the user changes the toggle, we express

14   the current value of that, make it available to the

15   developers through the API you just mentioned.

16   Q   Give me just one second.

17   MR. MIRZAIE: And, Grant, whenever you reach a

18   point for a break, just a quick morning bathroom break --

19   MR. SCHMIDT: Let's do it. Let's do it.

20   MR. MIRZAIE: All right.

21   THE VIDEOGRAPHER: We're going --

22   MR. SCHMIDT: Should we take five minutes?

23   MR. MIRZAIE: Sure, yeah.

24   MR. SCHMIDT: Okay. Thank you.

25   THE VIDEOGRAPHER: We're going off the record.

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1   This is the end of Media Unit 1. The time is

2   10:06 a.m.

3   (Break held off the record.)

4   THE VIDEOGRAPHER: We are back on the record.

5   This is the beginning of Media Unit 2. The

6   time is 10:16 a.m.

7   MR. SCHMIDT: I'm going to share on my screen

8   the -- see if we can find it here -- the video of your

9   May 2009 presentation, which has been marked Exhibit 2.

10   BY MR. SCHMIDT:

11   Q   Can you now see my screen, Mr. Sharkey?

12   A   I can, yes.

13   Q   I'm going to play just about 20 seconds of this

14   video, and I have a couple questions for you right after.

15   Here we go.

16   (Video played.)

17   BY MR. SCHMIDT:

18   Q   Mr. Sharkey, could you hear that?

19   A   Yes, I could.

20   Q   Was that your voice?

21   A   Yes, it was.

22   Q   At a high level, what is roaming?

23   A   Roaming is when a user is interacting with a

24   mobile network outside of their home area, so if I was in

25   a foreign country.

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 1        Q     Why is roaming expensive?

 2        A     Usually -- like, many carriers charge

 3   additional or much larger fees for data transfers when

 4   you're roaming.

 5        Q     In the context of this presentation that we've

 6   been discussing with the jury for May 2009, what do you

 7   want to avoid doing when roaming?

 8        A     In this specific case, the reason we're

 9   checking the roaming flag is to avoid costing the user

10   additional money.

11        Q     Very good.  All right.  I'm moving to a related

12   topic, but we're going to dive a little bit deeper into

13   the background and foreground functionality.

14              I want to do a quick dive into some of the

15   Google documents and when they existed.  I know there are

16   a lot of dates here, and I see some paper in front of

17   you.

18              Is there something that you might have prepared

19   to help you with some of the dates of the release of the

20   various source code?

21        A     So I have documents that my attorneys provided

22   me.

23        Q     Okay.  And what are those -- well, let me ask

24   you this:  Is there a document that your attorney has

25   provided -- I know earlier he mentioned that you have
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 1   access to the produced documents.

 2   Do you have a document that captures the

 3   various dates -- release dates of the various documents

 4   and other third-party documents that are subject of this

 5   depo?

 6   MR. YANG: Do you have a Bates number that

 7   you're referring to?

 8   MR. SCHMIDT: I don't. The answer might be no.

 9   BY MR. SCHMIDT:

10   Q   I'm just curious if you -- in anticipation of

11   this deposition, did you prepare a document that captures

12   some of these dates that we're going to be discussing

13   today?

14   The only reason I ask is there are a lot of

15   dates to be covered, and so I imagine that you might have

16   something that will help you throughout the deposition.

17   A   There's a document that summarizes Bates

18   Numbers 1 through 13 and dates associated with that.

19   Q   Okay. And is it possible -- I don't know --

20   MR. SCHMIDT: Lance, is it possible for you to

21   email us that document?

22   MR. YANG: I think I did this morning before

23   the deposition already.

24   MR. SCHMIDT: Okay. Very good. Very good.

25   Okay.

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 1              One second.

 2              MR. YANG:  Counsel, if you don't have it, I'm

 3     happy to resend it.

 4              MR. SCHMIDT:  One second.

 5              Okay.

 6     BY MR. SCHMIDT:

 7         Q     So do you see on that --

 8              MR. SCHMIDT:  I'm going to mark -- actually, I

 9     need to upload this.  So just give me -- give me just one

10     second.

11              Here we go.  And this will be marked as

12     Exhibit 36.  I know that's going to be a little

13     confusing, but it's because there are some premarked

14     documents.

15              THE WITNESS:  Unfortunately, I believe you're

16     muted.

17              MR. SCHMIDT:  Thank you.

18              Okay.  So, actually, I'm going to mark --

19     BY MR. SCHMIDT:

20         Q     Mr. Sharkey, I'm now marking the document that

21     we received from your counsel as Exhibit 4.

22              MR. SCHMIDT:  Sorry, Ms. Cooks.  I'm just going

23     to state that again.

24              This is Exhibit 4, and I'm going to share my

25     screen.
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 1              (Exhibits 4 & 36 marked.)

 2     BY MR. SCHMIDT:

 3         Q     All right.  Mr. Sharkey, can you see my screen

 4     now?

 5         A     Yes, I can.

 6         Q     Very good.

 7              Now, at a high level -- we're going to get into

 8     this later, but what is this first chart on the first

 9     page?

10         A     To my understanding, this is a summary of

11     several different Android applications that were

12     published on the Google Play Store, along with the dates

13     associated with them.

14         Q     All right.  Let's go to Page 2 of the document

15     that your counsel provided us, Exhibit 4.

16              Do you see here it says, "The initial

17     contribution corresponds to a version of Android that

18     Google made publicly," and then it gives a link, "on

19     October 21st, 2008"?

20              Do you see that?

21         A     Yes, I do.

22         Q     All right.  Now, I'm going to click that link.

23     That takes us to this page here.

24              Can you still see my screen?

25         A     Yes, I can.
```

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1   Q   All right. What is --

2   What are we looking at here?

3   A   This is a single Git commit that contains the

4   entire -- a snapshot of the entire Android operating

5   system when it was first made available in -- as open

6   source.

7   Q   How do you know that?

8   A   Through my day-to-day operations, this commit

9   is something that I -- when I trace back history of many

10   things I encounter.

11   Q   First of all, what is the Git commit?

12   A   Git is a source code management system. And a

13   commit is the atomic unit of a change being added -- a

14   change being made to source code.

15   Q   And I see "initial contribution" here.

16   What does that mean? What does "initial

17   contribution" mean?

18   A   So that is provided by the person that created

19   this commit. It's their summary of what is contained,

20   and it matches -- my understanding of what I shared

21   earlier, that it was the initial copy of the entire

22   operating system that we first made available in open

23   source.

24   Q   So would this be the operating system for

25   1.0 -- OS 1.0?

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1   A   I believe it may be slightly after 1.0

2   because -- and the reason is we changed source code

3   management systems.

4   Q   So when we see -- that makes sense.

5   When we see your October 21st, 2008, what does

6   that represent?

7   A   That's the timestamp when someone created this

8   Git commit.

9   Q   Is there a version number in this context --

10   oh, no, we -- yeah, we've handled that.

11   It's probably -- if it's not 1.0, it's close to

12   it.

13   Is that fair?

14   A   Yes. It's an early version of the operating

15   system.

16   Q   And this is available, obviously, to someone

17   like me who is not a software engineer and who is

18   accessing it in realtime.

19   Is that fair?

20   A   Yes, it's generally available to the --

21   Q   And why is that?

22   (Simultaneous unreportable crosstalk.)

23   BY MR. SCHMIDT:

24   Q   Why is that?

25   A   Because Android desires for people to take the

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```
 1     operating system and build new products and ideas with

 2     it.

 3               MR. SCHMIDT:  I'm going to -- just as a

 4     formality, I'm going to offer Exhibit 5.

 5               Let me stop presenting here.

 6               (Exhibit 5 marked.)

 7     BY MR. SCHMIDT:

 8          Q    I'll represent to you, Mr. Sharkey, that

 9     Exhibit 5 is simply a PDF of what we just looked at.

10               Let me just pull that up.

11               Do you see my screen?

12          A    I do.

13          Q    Okay.  Does this appear to be the same document

14     that we just linked to?

15          A    Yes, it appears to be the same.

16          Q    All right.  This date that we talked about,

17     October 21st, 2008, that's the same date that you had

18     referenced in the document you created, this Exhibit 4,

19     as it relates to the release date of this code.

20               Is that fair?

21          A    Could you ask that question again?

22          Q    Yes.

23               This October 21st, 2008 date, that matches your

24     Exhibit 4 where you talk about the initial contribution

25     being made available on October 28th -- I'm sorry --
```

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1   October 21st, 2008.

2   Is that fair?

3   A   That's a consistent statement, yes.

4   Q   Now, once you're in -- I'm going to go back to

5   the actual link so that we can access this in realtime.

6   Once you're in the code, there are various

7   links -- hold on one second. Let me make sure you can

8   see it.

9   Do you see these links below?

10   A   Yes.

11   Q   What are these links?

12   A   So a Git commit contains a series of changes to

13   any number of files, one or more. And in this case, each

14   of these links is to a file that was a component or a

15   part of this commit.

16   Q   For purposes of us understanding a little bit

17   more about this, I'm going to do control F for activity

18   Java.

19   Do you see that? I just have activity.java?

20   A   I do, yes.

21   Q   I'm going to click that. And then where does

22   this take us online?

23   A   This shows us the version of activity.java

24   source code that was made available at the time of this

25   commit.

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1   MR. SCHMIDT: I'm going to offer Exhibit 6 as

2   our next exhibit, which I will represent to you is just

3   simply a PDF version of what we linked to.

4   (Exhibit 6 marked.)

5   BY MR. SCHMIDT:

6   Q   Do you see my screen, Mr. Sharkey?

7   A   I do.

8   Q   And does this look to be consistent with the

9   link that we just accessed online?

10   A   It does, yes.

11   Q   I'm going to go to Page 10, Line 546. I want

12   to ask you about this.

13   Do you see where it references foreground

14   activity, and it says the activity at the top of the

15   screen?

16   A   I do see that, yes.

17   Q   What does that mean in this context? And by

18   that I mean, we're within the initial commit under this

19   activity.java that you just described, and now we're

20   seeing this reference to foreground activity.

21   What does that mean?

22   A   It's expressing -- it's highlighting to a

23   developer -- so developers can create one or more

24   activities inside of their application.

25   And this is describing -- it's giving them a

1   concrete definition of the term "foreground activity,"

2   which is a -- which -- connectivity is a component of

3   their app.

4   Q   What does top of the screen mean in this

5   context?

6   A   In this case, if the user were to hit -- hit

7   the back button on their device, there could be

8   additional activities behind the one that's at -- the one

9   at the top.

10   Q   I've seen references to user interface in

11 similar context.

12   Do you know what a user interface is?

13   A   Yes.

14   Q   Okay. And what is the difference between a --

15 strike that.

16   How does a user interface interact with this

17 concept of being top of the screen?

18   A   When an activity is at the top of the screen,

19 it has a large portion of real estate on the physical

20 screen where they can render a user interface for the

21 user to interact with.

22   Q   I want to look at Line 556. We're still within

23 Exhibit 6, which is the subset of the initial commit.

24 And I see now -- we just talked about foreground.

25   Do you see where it says background activity?

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1   A   I do, yes.

2   Q   And it says, "An activity that is not visible

3   to the user and has been paused."

4   Do you see that?

5   A   I do.

6   Q   So just at a high level, how is the background

7   activity defined in this context of the initial commit?

8   A   Reading directly from the source code -- the

9   code on screen, the documentation, it says, "An activity

10   that is not visible to the user and has been paused."

11   Q   When did the Android -- when did Google Android

12   first begin classifying foreground versus background

13   services?

14   MR. MIRZAIE: Objection. Form.

15   BY MR. SCHMIDT:

16   Q   Strike that.

17   Let me ask it this way: Did Android classify

18   foreground versus background -- strike that.

19   At some juncture, did Android begin classifying

20   foreground versus background services?

21   A   Yes, it did.

22   Q   When did that classification first begin?

23   A   Very early in the operating system history. I

24   don't recall the exact version.

25   Q   Would that have been at least by 2008?

Page 58

1   A   I don't recall, but if we have source code, I'd

2   be happy to look at it together.

3   Q   Let me ask it this way: Would it have been

4   before your May 2009 presentation?

5   A   Unfortunately, I don't recall.

6   Q   Okay. But let me ask you this: Earlier we

7   talked about the initial commit being released on

8   October 21st, 2008.

9   Do you remember that?

10   A   Yes.

11   Q   So is it fair to say that these classifications

12   between foreground and background were present at least

13   by October 21st, 2008?

14   A   Foreground and background activities, yes.

15   MR. SCHMIDT: All right. I am now going to

16   stop sharing my screen. I am going to share with you --

17   let me look at this here.

18   I'm going to share with you Exhibit 7.

19   (Exhibit 7 marked.)

20   BY MR. SCHMIDT:

21   Q   Mr. Sharkey, do you recognize this document?

22   A   I do, yes.

23   Q   What is this?

24   A   A tag is a specific type of commit, which marks

25   a point in a source -- in the Git history, which is

Page 59

1   immutable and cannot be changed.

2   Q   What is the date of this tag, if you will?

3   A   This tag was created on November 23rd, 2009.

4   Q   And who was the tagger?

5   A   The person was an engineer on the team. His --

6   we call him JBQ, by his username.

7   Q   And this process of tagging that you described

8   just now and earlier, is that a standard process for

9   Google to follow when uploading its code?

10   A   Yes, it is.

11   Q   Now, within this platform, is it fair to say

12   that this represents the operating system that is the 1.6

13   version? Is that fair?

14   A   Yes, that's accurate.

15   Q   Now, I'm going to see if this works. If you --

16   hold on one second.

17   I'm going to actually go to the link so that

18   way we can do exactly what we did a second ago.

19   Mr. Sharkey, do you see my screen now?

20   A   I do, yes.

21   Q   Is this just a live version of what we just

22   discussed, Exhibit 7?

23   A   Yes, it is.

24   Q   Are we within the 1.6 operating system?

25   A   Yes, we are.

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1   Q   So -- okay. One second. Just to ensure we're

2   on the same page, earlier you mentioned JBQ. I like that

3   nickname for the tagger.

4   Are you with me?

5   A   Yes.

6   Q   And then who is the author of this tag or this

7   commit?

8   A   So tag is referencing a commit. And in this

9   case, the tag was created by JBQ. JBQ's tag is a

10   specific reference to a specific commit. And the commit

11   that just happened to have been referenced -- the last

12   source code change that occurred before the 1.6 release

13   was officially made happened to have been made by this

14   person, Xav.

15   Q   Got it. So he is the author of this particular

16   commit?

17   A   That's correct.

18   Q   Very good. Now hang with me. I want to ask

19   you about a particular portion of this.

20   So if I go to -- let's see here. If I click

21   core and then I go to Java, and then I go to Android and

22   then I click app and then I go to ActivityManager; do you

23   see that?

24   A   I do, yes.

25   Q   Okay. Those were several steps, but this is

```
 1    important.
 2              What is the function of ActivityManager.java in
 3    this context?
 4         A    In the context of the Android operating system,
 5    it orchestrates the various components of the
 6    operating -- of applications, such as activities and
 7    services.
 8         Q    Now, I am just going to offer Exhibit 8, which,
 9    again, is the PDF version of what we just accessed.
10              (Exhibit 8 marked.)
11    BY MR. SCHMIDT:
12         Q    Do you see Exhibit 8 here, Mr. Sharkey?
13         A    I do, yes.
14         Q    Is this the same document -- is this the same
15    code that we just accessed online?
16         A    It is, yes.
17         Q    So at a high level, what kind -- you briefly
18    touched on this, but what kind of activity is managed by
19    the ActivityManager class?
20         A    Any and all activities on the device.
21         Q    We'll go to Page 11, and if we look at line 603
22    to 605, here it says a reference to a running process.
23              Do you see that?
24         A    Yes.
25         Q    And then it makes a reference to running app
```

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1   process info.

2   Do you see that?

3   A   I do.

4   Q   So for someone like me who needs a little bit

5   more background, at a basic level, what does the running

6   process refer to?

7   A   It refers to an application that is actively --

8   has been started and has the opportunity to run code.

9   Q   And if we keep going to Page 12, Line 649 --

10   we're still within the ActivityManager code for 1.6.

11   There's a reference to the relative importance

12   level that the system places on this process.

13   Do you see that?

14   A   I do, yes.

15   Q   And then there's a comment to importance

16   foreground, it may be that. There's a reference to

17   importance background.

18   Do you see that?

19   A   I do, yes.

20   Q   What does this portion of the code mean?

21   A   Any application that's running on the device,

22   ActivityManager determines its relative importance to all

23   of the other applications running and assigns an

24   importance value to that -- to each application.

25   Q   So what is a running process?

Page 63

1   A   It is a process in the Linux kernel that has

2   been started and can execute CPU instructions.

3   Q   So just to be clear, did the ActivityManager

4   class in the Android 1.6 classify importance of

5   applications based on, for example, foreground and

6   background?

7   A   Yes.

8   MR. MIRZAIE: Objection. Form.

9   THE WITNESS: Yes, it does.

10   BY MR. SCHMIDT:

11   Q   Let me ask it this way: In the context of your

12   2009 presentation, what were some of the ways that the

13   ActivityManager class in the Android 1.6 classified the

14   importance of applications?

15   A   Could you repeat the question, please?

16   Q   Yes.

17   In the context of your May 2009 presentation,

18   knowing that that's the context of us looking into the

19   code, what were -- what were some of the ways that the

20   ActivityManager class in the Android 1.6 classified the

21   importance of various applications?

22   A   It's a -- it's a little difficult to parse the

23   question.

24   Q   That's okay. No problem. Let me ask it a

25   different way.

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```
 1              Did -- let me ask you this:  Whether apps ran

 2    in the foreground or background, did that have an impact

 3    on how the ActivityManager class in Android 1.6

 4    classified the importance of various applications?

 5        A     Could you repeat the question again, please?

 6        Q     Yes.

 7        A     I want to make sure I give a precise answer, so

 8    I want to make sure I digest the question accurately.

 9        Q     No problem.

10              Let me ask you this way:  Did the

11    ActivityManager class in the Android 1.6 classify the

12    importance of applications according to whether they are

13    running in the foreground or background?

14        A     Yes, it did.

15        Q     All right.  Now, I am going to go back to the

16    actual code.  We're almost done here.  Hang with me.

17              So we're still -- Mr. Sharkey, I'll represent

18    to you, we're still within 1.6.

19              Do you see that on my screen?

20        A     Yes, I do.

21        Q     And we're not in a particular exhibit right

22    now.  We're just online.

23              Now, I'm going to go down a different path of

24    this code.  So I'm going to go to core, Java, Android,

25    net, and then ConnectivityManager.
```

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1   Do you see that?

2   A   I do, yes.

3   MR. SCHMIDT: Just so we have record of it, I'm

4   going to offer Exhibit 9, which is just a PDF of what we

5   just accessed.

6   One second.

7   (Exhibit 9 marked.)

8   BY MR. SCHMIDT:

9   Q   Mr. Sharkey, could you see Exhibit 9?

10   A   Yes, I see your screen.

11   Q   And is this the same code that we just

12   referenced online?

13   A   Yes, it is.

14   Q   At a very high level, when we're talking about

15   the ConnectivityManager, what kind of connectivity is

16   being managed by the ConnectivityManager?

17   A   Connections out to the wider internet.

18   Q   Now, if we go to Page 2, Line 106, we see right

19   here, "Broadcast action: The setting for background data

20   usage has changed values."

21   Do you see that?

22   A   I do.

23   Q   And then it says, "If an application uses the

24   network in the background, it should listen for this

25   broadcast and stop using the background data if the value

Page 66

1   is false."

2   Do you see that?

3   A   I do.

4   Q   What does this mean?

5   A   This means -- this is a broadcast that the

6   operating system sends to anyone that asks for it, to let

7   them know that the user preference has changed.

8   Q   Do you see the reference -- if we go down to

9   117, 118, do you see the TYPE_MOBILE and TYPE_WIFI

10   references?

11   A   I do, yes.

12   Q   Is that the same type of TYPE_MOBILE and

13   TYPE_WIFI we talked about earlier in your 2009

14   presentation?

15   A   Yes, they are the same.

16   Q   What does it mean when there's a zero next to

17   TYPE_MOBILE and a one next to TYPE_WIFI?

18   A   Those are numerical constants used internally,

19   unique values. And the type is a human readable -- or

20   human understandable value associated with those unique

21   constants.

22   Q   What impact does that code have on the use of

23   background data?

24   (Reporter clarification.)

25   MR. SCHMIDT: No problem.

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1   BY MR. SCHMIDT:

2   Q   Mr. Sharkey, what impact does this code, the

3   TYPE_MOBILE, TYPE_WIFI have on the use of background

4   data?

5   MR. MIRZAIE: Objection. Form.

6   THE WITNESS: For applications following our

7   best practice, they may choose to defer some of their

8   actions based on the network type.

9   BY MR. SCHMIDT:

10   Q   What are some of the -- what are some of the

11   tools -- so in this context, what are some of the tools

12   that the Android is providing for purposes of stopping or

13   starting background data?

14   A   In the case of the action background data

15   setting changed broadcasts, we're telling any

16   applications interested that the user preference has been

17   changed.

18   Q   And what actions can they then do with that

19   information? What can they do with that tool?

20   A   As the documentation on the screen references

21   the get background data setting, API, a developer can

22   obtain the current value and decide how they want to

23   proceed with pending operations inside of their app.

24   Q   If a cell phone is on mobile internet, does

25   this code provide certain instructions as it relates to

1   background data?

2   A   My best understanding of the background data

3   setting it is that -- it is agnostic to the network type.

4   Q   Okay. One second.

5   And then just so I understand, Mr. Sharkey, in

6   this context, why is there a zero next to TYPE_MOBILE and

7   a one next to TYPE_WIFI?

8   A   When we define constants in the operating

9   system, we typically always start as zero. As new values

10   are introduced, we increment by one each time so that

11   they remain unique.

12   Q   And are there any messages that are being sent

13   by that zero and that one as it relates to background

14   data?

15   MR. MIRZAIE: Objection. Form.

16   THE WITNESS: No. There's no signals related

17   to background data in those constants.

18   BY MR. SCHMIDT:

19   Q   Okay. I'm going to come back to that in just a

20   second. I want to show you Exhibit 10.

21   Before we do that, we're going to go back.

22   Hang with me.

23   We're still in 1.6. Do you see that?

24   A   Yes, I do.

25   Q   All right. So we're going to go to services,

Page 69

1   Java -- let's see. Okay. Now we're in there.

2   Android server and now ConnectivityService.

3   Do you see that?

4   A   I do, yes.

5   Q   Okay. And what does ConnectivityService mean

6   in this context?

7   A   It is the implementation of -- that is backing

8   ConnectivityManager.

9   Q   I'm going to offer what will be Exhibit 10,

10   which is merely a PDF of what we just looked at.

11   One second.

12   (Exhibit 10 marked.)

13   BY MR. SCHMIDT:

14   Q   Mr. Sharkey, do you see Exhibit 10 on the

15   screen?

16   A   I do.

17   Q   Is that the same document that we just looked

18   at --

19   A   Yes.

20   Q   -- at least now it's PDF form?

21   A   Yes.

22   Q   Okay. Now, I'm going to go to Page 7,

23   Line 337.

24   And do you see here it says,

25   "ConnectivityManager set background data setting."

Page 70

1   Do you see that?

2   A   I do see that, yes.

3   Q   What is the effect of that code?

4   A   It is returning the current user preference

5   that they had configured in the settings application.

6   Q   Does it have any impact on whether the user has

7   allowed an app to use background data?

8   MR. MIRZAIE: Objection. Form.

9   THE WITNESS: Could you ask the question again?

10   BY MR. SCHMIDT:

11   Q   Yes.

12   Does it have any impact on whether the user has

13   allowed an app to use background data?

14   MR. MIRZAIE: Objection. Form.

15   THE WITNESS: It's expressing the user's desire

16   systemwide.

17   BY MR. SCHMIDT:

18   Q   Desire for what in this context?

19   A   The desire for all applications on the device

20   to not use background data.

21   MR. SCHMIDT: Okay. We are now going to move

22   to 2.2, so hang with me here. I'm going to pull up a

23   link.

24   THE VIDEOGRAPHER: Counsel Schmidt, you've been

25   going for about an hour and 30 minutes.

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1   MR. SCHMIDT: Okay. Thank you.

2   BY MR. SCHMIDT:

3   Q   Mr. Sharkey, can you see -- hold on one second.

4   Can you see my screen here?

5   A   Yes, I can.

6   Q   Okay. This is what has been marked as

7   Exhibit 11.

8   (Exhibit 11 marked.)

9   BY MR. SCHMIDT:

10   Q   Do you recognize this document?

11   A   I do.

12   Q   What is it?

13   A   Similar to what we looked at earlier, this is a

14   tag that is marking the official -- the snapshot of the

15   Android code base when the Android 2.2_r1 release was

16   finalized.

17   Q   And in this instance, who or what was the

18   tagger?

19   A   In this case, it appears to be a mechanical

20   account or a robotic account.

21   Q   And who was the author of the commit?

22   A   The person -- so the commit that happened to

23   have been caught by this tag or referenced by this tag is

24   an engineer Chris Tate.

25   Q   And what was the date of the commit?

Page 72

1   A   The date of the commit was June 24th, 2010.

2   Q   And similar to the other code that we've

3   discussed, this code was kept in the same type of -- this

4   code was uploaded in the same mechanism -- strike that.

5   Was this code uploaded in the same way that the

6   other codes that we've discussed were uploaded?

7   A   Yes. The tags were created in the -- in the

8   open source project.

9   Q   And is that a common, consistent practice of

10   Google?

11   A   Yes, it is.

12   Q   All right. I am now going to pull up -- let me

13   stop sharing here. Just as a formality, I am going to

14   offer Exhibit 11. I know we just saw the link.

15   But, Mr. Sharkey, is this document the same as

16   the link we just looked at for 2.2?

17   A   Yes, it is.

18   Q   Very good. I'm going to share with you

19   Exhibit 12.

20   (Exhibit 12 marked.)

21   BY MR. SCHMIDT:

22   Q   Do you recognize this document, Mr. Sharkey?

23   A   I do, yes.

24   Q   What is this?

25   A   This is the ConnectivityManager source code as

Page 73

1   of the Android 2.2_r1 release.

2   Q   I'm going to go to Page 2, Line 110 --

3   actually, it's at the very top of Page 3 here.

4   Do you see where it says, "If an application

5   uses the network in the background, it should listen for

6   this broadcast and stop using the background data if the

7   value is false"?

8   A   Yes, I see that.

9   Q   What instruction does this code send in this

10   context?

11   MR. MIRZAIE: Objection. Form.

12   THE WITNESS: It's indicating that the user

13   preference has changed in the settings application.

14   BY MR. SCHMIDT:

15   Q   In what way has the user preference changed?

16   A   The user preference in the settings app to

17   allow background data, the user has requested -- has

18   requested that that be changed, that policy, to either

19   allow it or disallow it.

20   Q   So in this instance, the Android has given the

21   tools to either allow the background data or not allow

22   the background data.

23   Is that fair?

24   MR. MIRZAIE: Objection. Form.

25   THE WITNESS: Yes, Android gives developers

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1   those tools.

2   BY MR. SCHMIDT:

3   Q   Let me just -- given his objection, let me ask

4   it differently.

5   In this context, what are some of the tools

6   that the Android is giving when discussing the use of the

7   network in the background?

8   A   There's an API on ConnectivityManager to

9   request and determine the current user preference, if --

10   if the user has expressed the desire for it to restrict

11   background data.

12   Q   Okay. One second. Let me -- I am going to --

13   let's see here --

14   MR. MIRZAIE: What exhibit was that again,

15   Grant, sorry?

16   MR. SCHMIDT: Say that again.

17   MR. MIRZAIE: What exhibit was that again?

18   MR. SCHMIDT: That was Exhibit 12.

19   MR. MIRZAIE: Okay. Got it.

20   BY MR. SCHMIDT:

21   Q   Mr. Sharkey, I'm going to reference back

22   Exhibit 4 that you provided us -- your counsel provided

23   us.

24   Do you see my screen here?

25   A   I do, yes.

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1   Q   Okay. And can you just explain to me briefly,

2   what are the applications that are listed here?

3   A   As best as I know, these are applications

4   developed by third parties that were published on the

5   Google Play Store.

6   Q   And what are the dates in the far right corner?

7   A   They're a best -- they're our best

8   understanding of the first -- the first moment or the

9   first time when those apps would have been available to

10   users.

11   Q   Okay. And do you know -- do you have

12   knowledge, Mr. Sharkey, as to whether or not those are

13   individually APKs, those files?

14   A   My understanding is that each Bates number is

15   an APK.

16   Q   I'll represent that -- we're not going to go

17   through each of these, Mr. Sharkey, but in the context of

18   this depo, we will mark Exhibits 23 through 35 as being

19   the APKs that are reflected -- let me just confirm -- 1

20   through 13 -- yeah, that are reflected in this chart.

21   MR. SCHMIDT: That's mainly for Ms. Cooks.

22   (Exhibits 23-35 marked.)

23   MR. SCHMIDT: Okay. Can we take a ten-minute

24   break?

25   MR. MIRZAIE: Yeah.

                                                      Page 76

```
 1                    MR. SCHMIDT:  Okay.

 2                    THE VIDEOGRAPHER:  We're going off -- we are

 3      going off the record.

 4                    This is the end of Media Unit 2.  The time is

 5      10:58 p.m.

 6                    (Break held off the record.)

 7                    THE VIDEOGRAPHER:  We are back on the record.

 8                    This is the beginning of Media Unit 3.  The

 9      time is 11:09 a.m.

10      BY MR. SCHMIDT:

11          Q     All right.  We're back from a break.

12                    I am going to share with you again,

13      Mr. Sharkey, what is Exhibit 2, the video of your 2009

14      presentation.

15                    Can you see this?

16          A     I can, yes.

17          Q     All right.  And we are at a minute 17, second

18      13, and we're going to listen for just a few seconds.

19      I'm almost done.  And I want to ask you a couple of quick

20      questions after we hear this excerpt.  One second.

21                    (Video is played.)

22      BY MR. SCHMIDT:

23          Q     Mr. Sharkey, could you hear your voice in that

24      part of the video?

25          A     Yes, I could.
```

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1   Q   So I'm going to tie this back to some of the

2   code we discussed just a second ago.

3   But in the context of your presentation back in

4   2009 and ConnectivityManager, what types of tools did

5   Android give developers to check connectivity in this

6   context?

7   MR. MIRZAIE: Objection.   Form.

8   THE WITNESS: The APIs that were discussed here

9   that are offered by the platform provide the ability to

10   see -- to find information about the currently actively

11   connected network.

12   BY MR. SCHMIDT:

13   Q   And what types of decisions can the developers

14   or then thereby the users make as it relates to

15   connectivity and also background/foreground information?

16   MR. MIRZAIE: Objection.   Form.

17   THE WITNESS: By consulting values returned

18   from ConnectivityManager, developers can notice that a

19   network would be expensive or slow, and they can choose

20   to defer their work until a later time when a faster

21   network becomes available.

22   BY MR. SCHMIDT:

23   Q   In 2009, did the Android provide developers

24   tools or end users tools to restrict the background data

25   usage when roaming was present?

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1   MR. MIRZAIE: Objection. Form.

2   THE WITNESS: The operating system offered --

3   the API on the screen is network roaming, that a

4   developer could use as part of making their decision to

5   proceed with a network transfer or to wait until a later

6   time.

7   BY MR. SCHMIDT:

8   Q   In that context, did the Android provide

9   developers tools to allow background data to occur in the

10   context of Wi-Fi?

11   A   Could you reask the question?

12   Q   Sure, sure.

13   In 2009 when you gave this presentation, did

14   the Android provide developers and also end users the

15   tools to allow background data usage when there was a

16   Wi-Fi connection?

17   MR. MIRZAIE: Objection. Form.

18   THE WITNESS: Android offered APIs that

19   developers could blend together to decide to proceed with

20   a transfer based on things like Wi-Fi or a background

21   data setting the user at expressed.

22   BY MR. SCHMIDT:

23   Q   Earlier in the context of -- I'm going to pull

24   something up here again. One second. I'm going to pull

25   up Exhibit 9.

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```
 1              Just so we're on the same page, Mr. Sharkey, do

 2     you recognize Exhibit 9?

 3         A     I do, yes.

 4         Q     Okay.  I'll represent to you, again, this is

 5     ConnectivityManager in 1.6.

 6              Do you see that?

 7         A     I do, yes.

 8         Q     All right.  And we were talking about -- I'm

 9     going to go to Line 117.  Okay.

10              And earlier, we were talking about the code

11     here that has TYPE_MOBILE zero and TYPE_WIFI one.

12              Do you see that?

13         A     I do, yes.

14         Q     And what I want to make sure I understand is:

15     In this context, is this an example of the Android giving

16     the developer or the user the tools to make a decision as

17     to when background apps will be used?

18              MR. MIRZAIE:  Objection.  Form.

19              THE WITNESS:  It's giving them information

20     about the -- about a network connection type, which could

21     be -- which the developer could blend together with

22     background -- other background signals.

23     BY MR. SCHMIDT:

24         Q     And so in that context, when the developer

25     blends together, there is an ultimate -- strike that.
```

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1   In that context, when the developer blends

2   together the substance that you discussed, is it possible

3   for the developer to use the tools from Android to allow

4   background apps when there's a Wi-Fi connection but not

5   allow it when there's a mobile connection?

6   MR. MIRZAIE: Objection. Form.

7   THE WITNESS: Yes, combined together, those

8   tools give the developer the ability -- that ability.

9   BY MR. SCHMIDT:

10   Q   And in the context of this 2009 presentation,

11   when we've been discussing the various tools that are

12   capable and the tools that are present in this code, all

13   the things you discussed in your presentation are items

14   that Google is teaching developers and end users how to

15   use.

16   Is that fair?

17   A   The presentation is primarily aimed at

18   developers, yes.

19   Q   And is the goal -- strike that.

20   What is the goal of these presentations when

21   focused on the developers?

22   A   So that our collective ecosystem of the Android

23   operating system with applications offers an excellent

24   user experience to our -- to our combined users.

25   Q   And what are -- what are -- just to wrap up,

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```
 1   what are some of the tools that Android is teaching the

 2   developers when it comes to managing background based on

 3   connection type?

 4       A     It's helping point them to the APIs that they

 5   can call to determine user preferences and to determine

 6   current network conditions, which the developer can then

 7   blend together to decide how they want to proceed with

 8   network traffic.

 9             MR. SCHMIDT:  We'll pass the witness and

10   reserve the additional time.

11             Mr. Sharkey, thank you very much for being here

12   today.

13             MR. MIRZAIE:  So yeah, I think we had talked,

14   Grant, about like a 10- to 15-minute break right now

15   so -- for everybody.  We can either take like a 25-minute

16   break and -- for folks to have lunch and then come back

17   so it's not, you know, inefficient, or we can just take

18   about a 10 to 15 one now and then a lunch break when --

19   you know, on the next one.

20             It's up to you guys.

21             MR. SCHMIDT:  Whatever Mr. Sharkey wants.

22             MR. MIRZAIE:  I agree.

23             THE WITNESS:  Our lunch here doesn't start

24   until 11:30.  So we can do two things.  We can take --

25             (Reporter clarification.)
```

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1   THE VIDEOGRAPHER: Thank you.

2   We're going off the record. This is the end of

3   Media Unit 3. The time is 11:18 a.m.

4   (Break held off the record.)

5   THE VIDEOGRAPHER: We're back on the record.

6   This is the beginning of Media Unit 4. The

7   time is 11:38 a.m.

8   EXAMINATION

9   BY MR. MIRZAIE:

10   Q   Good morning, Mr. Sharkey.

11   A   Yes, sir.

12   Q   So I'm going to ask you a series of questions

13   just like my colleague Mr. Schmidt just did. I represent

14   Headwater. It's good to meet you finally.

15   So I uploaded some documents into the Google

16   Drive. Maybe we could start with a little bit of

17   background.

18   I uploaded two documents. One is -- I labeled

19   Exhibit 37 just to pick up on where we left off on the

20   numbering, and one I labeled as Exhibit 38.

21   (Exhibit 37 marked.)

22   (Exhibit 38 marked.)

23   BY MR. MIRZAIE:

24   Q   If you could open Exhibit 37 for a moment. I

25   wanted to take care of some housekeeping here.

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 1              Let me know when you have that open.
 2      A      Yes, I have the file, Exhibit 37, Headwater
 3   notice of subpoena to Google open.
 4      Q      Okay.  Thanks.  And I think you just identified
 5   the document for me, so that was my next question.
 6              My second question after that was going to be:
 7   Have you seen this document before?
 8      A      Yes, I have.
 9      Q      And you understand that you're here today to
10   testify on behalf of Google and also in your personal
11   capacity; correct?
12      A      Yes, I understand that.
13              MR. YANG:  Counsel, sorry, just for the record
14   here, Mr. Sharkey's designated as Google's corporate
15   representative on Headwater Topics 2, 3, 4, 6, and 7,
16   subject to Google's objections and responses.
17              MR. MIRZAIE:  Right.  Yeah, that's where I was
18   going to go next.
19   BY MR. MIRZAIE:
20      Q      So if you could flip through that document,
21   sir, and get to Topic 2.
22      A      I found the section titled Request Number 2 and
23   Topic Number 2.
24      Q      Do you understand that you're here to testify
25   on, just piggybacking on your counsel's comments, Topics
```

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1   2 through 4, 6, and 7 on behalf of Google as a

2   corporation?

3   A   Yes, I understand that.

4   Q   And I assume you prepped for today's

5   depo; correct?

6   A   Yes. I've been meeting with counsel.

7   Q   About how many meetings?

8   A   Approximately ten.

9   Q   Okay. And when you say "counsel," do you mean

10   counsel for Google?

11   A   Yes, that's correct. Counsel for Google, yeah.

12   Q   Okay. And was there -- you may not know who

13   represents who, but do you understand that there was any

14   counsel for Samsung involved in the prep as well?

15   A   Not that I'm aware of.

16   Q   Okay. And so you had ten meetings with

17   Google's counsel, and -- approximately, when was the

18   first one, by the way?

19   A   I don't recall the exact date, but it was

20   approximately in Q4 of 2023.

21   Q   Okay. And what did you do to prepare for

22   Topic 2 -- strike that, actually.

23   If we take a look at the document again --

24   sorry.

25   What did you do to prepare to testify on

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1   Topic 4?

2   MR. YANG: And I'll just caution the witness

3   not to reveal any communications you may have had with

4   your attorneys in preparing for Topic Number 4.

5   THE WITNESS: I would say in preparing for

6   Topic Number 4, we reviewed the relevant Bates numbers

7   listed.

8   BY MR. MIRZAIE:

9   Q   Did you do anything beyond just reviewing the

10   relevant Bates numbers listed, if you could recall?

11   MR. YANG: Again, I also caution the witness

12   not to reveal any communications you've had with your

13   attorneys.

14   THE WITNESS: Could you repeat the question?

15   BY MR. MIRZAIE:

16   Q   Yes.

17   Did you do anything other than reviewing the

18   relevant Bates numbers listed?

19   MR. YANG: Same caution.

20   THE WITNESS: Discussed with counsel things

21   that I believe that are attorney-client privileged.

22   BY MR. MIRZAIE:

23   Q   Okay. So there's no other -- nothing else that

24   you could tell me, subject to that objection, about what

25   you did beyond just reviewing the Bates-numbered

Page 86

1   documents identified.

2   Is that fair?

3   A   That's accurate, yes.

4   Q   And if we go to Topic 6.

5   A   Yes, I found it.

6   Q   Okay. Thank you.

7   What did you do to prepare for Topic 6?

8   A   I reviewed the public developer documentation

9   that -- that Android publishes on its website.

10   Q   Did you do anything else to prepare for

11   Topic 6?

12   A   Reviewed relevant Bates numbers.

13   Q   Anything else you could tell me besides those

14   two things?

15   A   Nothing beyond those.

16   Q   And you see the, I guess, features listed

17   there: Data saver, app standby, doze. We can start with

18   those three.

19   Do you see that?

20   A   I do, yes.

21   Q   And you're familiar with those features to some

22   extent.

23   Fair?

24   A   That's accurate, yes.

25   Q   And before prepping for the deposition today,

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1   you were also familiar with those features at a technical

2   level; correct?

3   A   Yes.

4   Q   And can you, just starting at a high level,

5   tell me what role you played, if any, in the ultimate

6   development of all the code that those features rely on?

7   MR. YANG: Object to form.

8   THE WITNESS: I developed personally a lot of

9   the foundational capabilities that enabled the data saver

10   feature.

11   For app standby and doze, I was a close

12   collaborator, sharing an office -- a physical office with

13   the other engineers that worked on that feature.

14   BY MR. MIRZAIE:

15   Q   So just to understand your verbiage there a

16   little bit better, so would you say that you were more

17   involved in the development of data saver or more

18   involved with the development of app standby and doze?

19   A   I was more involved with the foundational

20   behavior for data saver.

21   Q   Okay. And when you say "foundational

22   behavior," what files or behaviors are you referring to?

23   A   Yeah, one of the key foundational files is

24   Network Policy Manager.

25   Q   Got it.

                                              Page 88

```
 1              And you were involved in developing that

 2     file; correct?

 3          A    Yes.

 4          Q    Would you say you were the key person involved

 5     in developing that file?

 6              MR. YANG:  Object to form.

 7              THE WITNESS:  I would say yes.

 8              (Reporter clarification.)

 9              (The record was read back as follows:

10                  "Question:  Would you say you

11              were the key person involved in

12              developing that file?")

13              THE WITNESS:  Network Policy Manager, yes.

14     BY MR. MIRZAIE:

15          Q    And by the way, did you name that file?

16          A    I believe I came up with the name, yes.

17          Q    And then if we go back to the document, after

18     doze, there's adaptive battery, power saving, adaptive

19     power saving, job scheduler, background usage limits, and

20     mobile data only apps.

21              Do you see that?

22          A    I do, yes.

23              MR. YANG:  Counsel, just for the record, we've

24     noted in our objections to these, some of these are not

25     Android or Google terms.  Some of them appear to be terms
```

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1   from other software programs.

2   MR. MIRZAIE: Yeah, you noted that on

3   discussions -- meet and confers with us, and I think if

4   you could keep your speaking objections to a minimum, I'd

5   appreciate that today.

6   BY MR. MIRZAIE:

7   Q   So, sir, on -- Mr. Sharkey, on those items that

8   I just read, which of those, I guess, features do you

9   recognize?

10   A   Job scheduler in particular stands out as

11   something I'm familiar with.

12   Q   And what role did you play, if any, in

13   developing the job scheduler code?

14   A   I was involved with reviewing the technical

15   design performed by another engineer.

16   Q   Who was that other engineer?

17   A   I believe the engineer was Chris Tate.

18   Q   We've seen his name today, I believe.

19   And do you know if data saver calls or listens

20   to job scheduler?

21   MR. YANG: Object to form. Object as beyond

22   the scope.

23   THE WITNESS: I do not believe that Network

24   Policy Manager listens to job scheduler.

25   ///

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```
 1    BY MR. MIRZAIE:

 2        Q     And by the way, I guess -- you know, kind of

 3    belts and suspenders here, but we've been speaking a lot

 4    of technical jargon.  You've been helping Grant and

 5    myself out with that.

 6             But what does it mean for, I guess, one piece

 7    of code to listen to another piece of code?

 8             MR. YANG:  Object to form.

 9             THE WITNESS:  One mechanism is that code can

10    register a callback to be notified when something changes

11    in another location.

12    BY MR. MIRZAIE:

13        Q     Is there another mechanism according to the

14    usage of "listen to" as you just used the term?

15        A     Another example in the Android operating system

16    would be broadcast intents.

17        Q     And I guess that's different than recommending

18    for a callback.

19             Is that fair?

20             MR. YANG:  Object to form.  Beyond the scope.

21             THE WITNESS:  Can you repeat the question?

22    BY MR. MIRZAIE:

23        Q     Yeah.

24             Is that different from requesting for a

25    callback?
```

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1   A   Mechanically they're different. They result in

2   very similar -- they can result in very similar-resulting

3   behavior.

4   Q   Got it.

5   And can you describe listening to broadcast

6   intents? How does that process work in Android code,

7   just in general?

8   MR. YANG: Same objections.

9   THE WITNESS: Applications can indicate they

10   would like to receive broadcast intents either in their

11   manifest, or they can register for them dynamically.

12   BY MR. MIRZAIE:

13   Q   And what would happen under either scenario?

14   If you could just give another sentence -- a

15   description of how that would work, please.

16   A   When a developer has indicated their interests

17   in a broadcast, from that point forward on the device,

18   when that action -- the broadcast action occurs, we go

19   notify those applications that the broadcast has

20   happened.

21   Q   And for a third-party app to listen to a

22   broadcast intent, that process in and of itself would use

23   battery; correct?

24   A   Very minimal battery. Just the act of

25   registering for it.

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1   Q   Certainly the act of registering for it would,

2   but would the act of listening for it would -- strike

3   that.

4   Would the act of listening to broadcast intents

5   also require battery consumption?

6   A   The long-term act of delivery, like, yes, it

7   would consume battery to receive each broadcast.

8   Q   And for third-party code to listen to broadcast

9   intents, does it need any type of special permission or

10   privilege in order to do that?

11   A   It depends on each broadcast action. By

12   default, they're not protected, and anyone can request

13   and listen to them. But each broadcast action can be

14   tailored with permissions or flags to indicate

15   restrictions.

16   Q   And you're aware of some of those

17   restrictions; correct?

18   A   Yes.

19   Q   And sometimes those restrictions relate to

20   security? In other words, if the user wants a system to

21   be more secure, then it would restrict some of those

22   permissions from a third-party app being able to listen

23   to broadcast; correct?

24   A   Yes, that's correct.

25   Q   So all else being equal, not listening to

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1   broadcast intents would tend to make the device more

2   secure or at least as secure.

3   Fair?

4   A   Broadcasts are such a large topic. I don't

5   think I could offer a blanket answer.

6   Q   Okay. We could come back to that. I

7   appreciate it.

8   Okay. So going back to the list in Topic

9   Number 6, are you familiar with anything else -- well,

10   strike that.

11   Are you familiar with something called adaptive

12   battery?

13   A   Not --

14   MR. YANG: Hold on a second.

15   Objection. Beyond the scope.

16   You can go ahead and answer.

17   THE WITNESS: Not as a particular term of art

18   on Android. It may -- it may exist, but I may not be

19   aware of it.

20   BY MR. MIRZAIE:

21   Q   Thank you.

22   And what about power saving?

23   MR. YANG: Objection. Beyond the scope.

24   THE WITNESS: Again, it may -- I don't know if

25   that term exists in the Android code base.

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```
 1      BY MR. MIRZAIE:

 2          Q      What about adaptive power saving?

 3               MR. YANG:   Same objection.

 4               THE WITNESS:   It's a term I'm unfamiliar with.

 5      I don't know if it occurs in the code base.

 6      BY MR. MIRZAIE:

 7          Q      And just to finish off the list, would you have

 8      the same answer for background usage limits and mobile

 9      data only apps?

10               MR. YANG:   Same objection.

11               THE WITNESS:   Yes.   They've -- same answer to

12      both.   Like, they're descriptive, but I'm not aware of

13      them being expressed in the source code of the Android

14      operating system.

15      BY MR. MIRZAIE:

16          Q      Thank you.

17               And do you understand that data saver, app

18      standby, and doze mode are accused features in this

19      patent infringement case?

20               MR. YANG:   Hold on.

21               I caution the witness not to reveal any

22      communications or information he may have learned through

23      your discussions with attorneys; otherwise, if you have

24      information to offer, you can provide an answer.

25               MR. MIRZAIE:   And it was a "yes" or "no."   So I
```

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1   think at a yes-or-no level, it's a legitimate question

2   that doesn't call for attorney-client privileged

3   information.

4   MR. YANG: It does if his answer is only --

5   "yes" or "no" is only based on his information he learned

6   from attorneys.

7   MR. MIRZAIE: I disagree. But let's continue.

8   BY MR. MIRZAIE:

9   Q   Sir, do you understand that data saver, app

10   standby, and doze mode are accused in this case of

11   infringement?

12   MR. YANG: Again, I caution the witness not to

13   reveal any information he may have learned through his

14   attorneys.

15   But if you can answer that "yes" or "no" --

16   (Reporter clarification.)

17   MR. YANG: Sure.

18   I caution the witness not to reveal any

19   communications or information he learned from his

20   attorneys.

21   But to the extent you have information, you can

22   respond "yes" or "no" to that outside of communications

23   with attorneys, feel free to do so.

24   THE WITNESS: Outside of privileged

25   communications, I have no knowledge of what you

1   described.

2   BY MR. MIRZAIE:

3   Q   And you do -- strike that.

4   You are aware that Samsung phones are

5   Android-based phones; correct?

6   A   I'm aware that some Samsung phones run the

7   Android operating system, yes.

8   Q   And what familiarity do you have on the

9   commercial side with Google or Android's commercial

10   relationship with Samsung?

11   MR. YANG: Objection. Form.

12   MR. MIRZAIE: Objection. Form.

13   MR. YANG: Sorry.

14   Same objection. Also object as beyond the

15   scope.

16   THE WITNESS: I would answer I don't, because

17   it's beyond the scope of my job responsibilities as a

18   software engineer.

19   BY MR. MIRZAIE:

20   Q   Back to Topic Number 6.

21   So you are familiar with data saver, app

22   standby, and doze mode; correct?

23   A   Yes.

24   Q   Did you search your emails for any emails

25   pertaining to any of those three features?

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1   A   Yes, as part of responding to the subpoena.

2   Q   And is it true that you found no emails

3   referencing -- sorry --

4   A   May I clarify -- yeah, may I clarify my role?

5   So to clarify my answer there, I performed the

6   search you described on my personal records as me as an

7   individual.

8   Q   Okay. And by that, you just mean your personal

9   laptop or personal Gmail account?

10   A   Yes, sir.

11   Q   And you didn't find any documents referencing

12   any of those features?

13   A   I provided all relevant items that were

14   requested in the subpoena.

15   Q   Do you recall finding emails relating to those

16   features?

17   A   I do not recall.

18   Q   You don't recall one way or another?

19   A   No. I do not recall finding documents related

20   to any of those three features in my personal documents

21   or personal email.

22   Q   Okay. And you discussed earlier the foundation

23   or foundational code of data saver being network policy

24   or Network Policy Manager.

25   Did you run any searches for that?

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1   MR. YANG: Object to form.

2   You can answer.

3   THE WITNESS: It was -- because it was not

4   referenced in the subpoena, I did not do a direct search

5   for those items in my personal records.

6   BY MR. MIRZAIE:

7   Q   And besides your personal records, are you

8   familiar with how Google maintains other records? And if

9   so, can you describe that.

10   MR. YANG: Object to form. Object as beyond

11   the scope.

12   And I caution the witness not to reveal any

13   information he may have learned through your discussions

14   with attorneys or anyone working on the legal teams at

15   Google.

16   THE WITNESS: And can you repeat the question,

17   please?

18   BY MR. MIRZAIE:

19   Q   Yes.

20   Apart from your personal records, in the course

21   of your ordinary work as an engineer at Google, you have

22   some familiarity with how Google stores records; correct?

23   MR. YANG: Same objections and same caution.

24   THE WITNESS: I'm aware that my emails expire

25   after a certain time unless I've marked them as needing

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1   to be saved.

2   BY MR. MIRZAIE:

3   Q   And what time is that? What time period is

4   that?

5   MR. YANG: Object as beyond the scope.

6   I caution the witness not to reveal any

7   information he may have learned through communications

8   with attorneys or the legal team at Google.

9   THE WITNESS: I do not recall the exact

10   threshold that's used.

11   BY MR. MIRZAIE:

12   Q   And were you involved in any document searches,

13   apart from your personal files, but for Google-retained

14   documents concerning any of the three features that we

15   just discussed with respect to Request Number 6, namely,

16   doze, app standby, or data saver?

17   MR. YANG: And that's just a -- that's a

18   yes-or-no question, and I'll caution, again, not to

19   reveal any information you may have learned through your

20   discussions with attorneys or Google legal counsel.

21   THE WITNESS: If you could repeat the question.

22   BY MR. MIRZAIE:

23   Q   Yeah. One second.

24   Were you involved in any document searches,

25   apart from searching your personal files, on behalf of

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1   Google, searching Google-retained documents concerning

2   data saver, app standby, or doze mode?

3   MR. YANG: Again, same objections and beyond

4   the scope.

5   And I caution you not to reveal any information

6   you may have learned through your attorney or Google's

7   legal team.

8   THE WITNESS: My answer to that question is no.

9   BY MR. MIRZAIE:

10   Q   Do you know of anyone else who was so involved?

11   MR. YANG: Same objections -- sorry, did I cut

12   you off?

13   MR. MIRZAIE: No. I just said "yes" or "no."

14   It's a yes-or-no question. It doesn't call for

15   attorney-client privileged information, so...

16   MR. YANG: It does call for attorney-client

17   privileged information to the extent that the information

18   he learned was through his communications with attorneys.

19   So, again, you could answer "yes" or "no," but

20   don't reveal any information you may have learned just

21   through your communications with attorneys or Google's

22   legal team.

23   THE WITNESS: And could you repeat the question

24   again just to make sure I accurately answer it?

25   ///

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```
 1    BY MR. MIRZAIE:

 2        Q     Yeah, yeah.  No problem.

 3              The question was:  Are you aware of anyone else

 4    at Google who was involved in searching for documents

 5    concerning doze mode, app standby, or data saver?

 6              MR. YANG:  Same objection and caution.

 7              THE WITNESS:  My answer is no.

 8    BY MR. MIRZAIE:

 9        Q     Okay.  Are you planning to appear live at trial

10    in this matter?

11        A     I've -- no one has requested that of me.

12        Q     Sitting here today, do you know if you plan to

13    or not?

14        A     No one has requested either direction.

15        Q     If someone requested, would you appear live?

16        A     Subject to personal schedule constraints, I

17    would be available.

18        Q     Okay.  All right.  Let's see.  I did want to --

19    kind of sticking just to some belts and suspenders on the

20    platform, maybe before the lunch break we could just talk

21    about how an app would request network access.

22              Is that okay if we just talk about that for a

23    few minutes?

24        A     Yes.

25        Q     Can you describe for me how an app would
```

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1   request network access? And I mean an Android app,

2   obviously.

3   A   As that space has evolved and changed many

4   times over Android's history, can you help refine -- is

5   there a particular version that you're interested in?

6   Q   Good question.

7   So let's start with today.

8   A   So I believe applications still need to declare

9   in their manifest an internet permission, which indicates

10   their desire to access a network. And I believe as long

11   as they've declared that, they're able to look at the

12   currently active network connection and initiate

13   connections to the internet.

14   Q   And let me take a step back -- well, strike

15   that.

16   Are you aware of any earlier versions, sitting

17   here today, where the Android apps would request internet

18   access some other way?

19   MR. YANG: Object to form.

20   THE WITNESS: Depending on the exact Android

21   version you're interested in, there are some APIs on

22   ConnectivityManager to request a particular network.

23   (Reporter clarification.)

24   THE WITNESS: ConnectivityManager.

25   ///

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```
 1    BY MR. MIRZAIE:

 2        Q     Okay.  So if you know off the top of your head,

 3    let's say we were talking about version -- Android

 4    Version 2.2.

 5        A     Unfortunately, I don't know off the top of my

 6    head.  But if we have source code, I can help look at it.

 7        Q     Okay.  Do you know off the top of your head for

 8    Version 1.6 how an app would request network access,

 9    generally speaking?

10        A     Generally speaking, I would say it's consistent

11    with what I described earlier where they define the

12    internet permission in the -- in their manifest of the

13    application.  And if the user had installed the

14    application, then they're able to see active networks and

15    open network connections to the internet.

16        Q     And at any rate, from 1.6 all the way until

17    today, you know, apps would request internet

18    access; correct?

19             MR. YANG:  Hold on a second.

20             Object to form.

21             THE WITNESS:  I would say it's one of the most

22    popular permissions that Android apps would request, the

23    ability to access the internet.

24    BY MR. MIRZAIE:

25        Q     Okay.  One other follow-up here.
```

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1   Do you have the exhibits from this morning in

2   front of you somewhere?

3   A   I do.

4   Q   We talked this morning about the background

5   data setting.

6   Do you recall that?

7   A   I do, yes.

8   Q   I believe you described it as a flag that the

9   user can toggle on or off?

10   A   That's accurate, yes.

11   Q   I forget if -- you know, when it's on, then the

12   user's exhibiting a desire to not use background data, or

13   was it when it's off? Sorry.

14   MR. YANG: Object to form.

15   THE WITNESS: I would have to look at the exact

16   documentation on the API to remind -- to refresh my

17   memory. And similarly, like, I would have to look at the

18   screenshot of the settings app to remind myself of how it

19   was displayed to the user.

20   BY MR. MIRZAIE:

21   Q   But it's either going to be, you know, when the

22   flag is set as true, then it's on or off. It will be

23   either one. It's binary; right?

24   A   It is a binary flag, yes.

25   MR. YANG: Sorry.

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 1   Object to form.

 2   THE WITNESS: My answer is it is a binary flag,

 3   yes.

 4   BY MR. MIRZAIE:

 5   Q   In any event, the user can toggle it to check

 6   the no background data flag; correct?

 7   A   The user in the settings app can -- can change

 8   the toggle, yes.

 9   Q   And when the user desires a, quote/unquote, no

10   background data, what does that mean when you use the

11   term "background data" there?

12   Can you define "background data" in that

13   specific setting.

14   A   I'd have to look at an exact screenshot to

15   refresh my memory of how it was presented to a user, but

16   my broad understanding is that background data would be

17   data that -- data that is used when the user doesn't

18   expect it or is unaware of it.

19   Q   And maybe if you have your IO presentation in

20   front of you.

21   A   I do.

22   Q   If you could go to -- I don't know if this will

23   help, but if you could go to Slide 29.

24   A   Could you reference that by Bates number.

25   Q   Yes, 120.

```
1        A      Yes, I'm looking at 120.

2        Q      If you see the second bullet point -- well, the

3    second darkened bullet point uses the phrase "no

4    background data"?

5        A      Yes, I see that.

6        Q      And does that refresh your recollection of what

7    no background data means?

8        A      I don't think it provides any additional

9    definitions.

10       Q      Okay.  So as you sit here today, your broad

11   understanding is that background data would be data that

12   is used when the user doesn't expect it or is unaware of

13   it.

14              Is that fair?

15              MR. MIRZAIE:  Object to form.

16              THE WITNESS:  I would say that's the broad

17   understanding of a typical end user.

18   BY MR. MIRZAIE:

19       Q      And that covers usage -- usages beyond just

20   apps running in the background.

21              Fair?

22              MR. SCHMIDT:  Objection to form.

23              MR. YANG:  Same objection.

24              THE WITNESS:  Could you clarify your question?

25   ///
```

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```
 1      BY MR. MIRZAIE:
 2          Q      Yeah.  Let me ask a different question, if
 3      that's okay, so strike that.
 4               What are some examples of background data as
 5      it's used in this slide?
 6          A      So as it's used in this slide, a potential
 7      example might be the calendar app, which is listed at the
 8      top as having heavy network usage.  And the implication
 9      is that it may be at the top because of heavy background
10      usage.
11          Q      And when you say "background usage," you
12      mean -- strike that.
13               So taking a step back, apps can be in,
14      quote/unquote, the foreground or the background; correct?
15               MR. YANG:  Object to form.
16               Go ahead.
17               THE WITNESS:  Foreground or background states,
18      broadly, yes.
19      BY MR. MIRZAIE:
20          Q      And are there only two states, or are there
21      more than two states?
22          A      There's many states, and typically the
23      operating system uses a particular threshold to decide if
24      it's -- if an application is considered foreground or
25      background.
```

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1   Q   And --

2   A   It's on a -- it's on a single dimension. There

3   are many states on a dimension, and there's a particular

4   threshold, which the operating system can use to

5   determine is it foreground or background.

6   Q   And we'll just talk about Version, I guess, 1.5

7   that you referred to on this page here, this slide.

8   That was true in 1.5 as well; correct or no?

9   A   To the best -- to the best of my recollection,

10 yeah, ActivityManager, yes, maintained -- like, it

11 assigned a score to every running application along a

12 continuum.

13   Q   And depending on the score, the app would be

14 either scored as running in the background or running in

15 the foreground and no other option.

16   Is that your testimony?

17   MR. YANG: Hold on.

18   Object to form.

19   Go ahead.

20   THE WITNESS: I'm pausing as I reflect on 1.5.

21 BY MR. MIRZAIE:

22   Q   Okay. Thanks.

23   A   I know that in Ice Cream Sandwich, we used the

24 threshold description that I described, the threshold of

25 being above a certain level as being foreground.

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1   That -- I don't -- I don't know if there were

2   any instances in Cupcake, in 1.5 of a threshold being

3   used, but as we saw earlier, there is -- in some of the

4   naming, there was -- it was indicated that there were --

5   there were states that it could be in an important state

6   where we knew it would -- we would classify it as being

7   in the foreground or the background.

8   Q   But sitting here today, I guess, just

9   piggybacking on your last answer -- strike that.

10   Sitting here today, you don't know if there

11   were any instances in Cupcake, in 1.5 of a threshold

12   being used -- the threshold indicating background or else

13   foreground; correct?

14   MR. SCHMIDT: Hold on.

15   Object to form.

16   MR. YANG: Object to form.

17   THE WITNESS: Several -- as we saw earlier,

18   several of the constants along that continuum included

19   the label -- the descriptor of foreground and background.

20   Other parts of the operating system

21   interpret -- can interpret that spectrum to decide that

22   something is foreground or background.

23   BY MR. MIRZAIE:

24   Q   When you say "descriptor," are you referring to

25   comments in the code or something else?

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1   A   No.   No.   The names of the constants that we

2   observed earlier.

3   Q   Okay.   I just wanted to confirm the testimony a

4   little bit earlier.

5   But it's fair that you don't know if there are

6   any instances in Cupcake, in 1.5 of a threshold being

7   used; the threshold being background or foreground.

8   Correct?

9   MR. SCHMIDT: Objection.   Form.

10   MR. YANG: Same objection.

11   THE WITNESS: A threshold of consuming that

12   importance.

13   BY MR. MIRZAIE:

14   Q   And what do you mean by "consuming that

15   importance"?   Do you mean using or -- that importance?

16   A   So we saw examples earlier wherein the Cupcake

17   source code -- or in the Cupcake or Donut source code

18   where certain importance of values like -- are indicative

19   of an application running in the foreground or the

20   background, so that is already -- already expresses that

21   inherently.

22   Other examples in Ice Cream Sandwich later

23   consume the raw importance value and use a threshold to

24   say everything above a certain state is foreground even

25   if the name of the constant doesn't include the word

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1   "foreground" in it.

2   Q   But before Ice Cream Sandwich, sitting here

3   today, you're not aware of any instances in which the

4   code consumed the importance value or a threshold to

5   determine the background or foreground; correct?

6   MR. SCHMIDT: Objection. Form.

7   MR. YANG: Objection to form and objection as

8   beyond the scope.

9   THE WITNESS: Could you repeat the question to

10   make sure I answer it accurately?

11   BY MR. MIRZAIE:

12   Q   Yeah, yeah, no problem.

13   I'm just quoting from your earlier answer.

14   Before Ice Cream Sandwich, sitting here today,

15   you're not aware of any instances in which the Android

16   code consumed the importance value or a threshold of

17   background or foreground; correct?

18   MR. YANG: Same objections.

19   MR. SCHMIDT: Same objections.

20   THE WITNESS: Could you elaborate on what

21   you mean by the word "consumed" or "consume"?

22   BY MR. MIRZAIE:

23   Q   Yeah, I think you're the first one to use the

24   word.

25   Do you recall that?

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1   A   I see. I see.

2   Q   And you used in your prior answer -- and I

3   could just read it.

4   You used the phrase, "consuming the importance

5   of the threshold value."

6   That versions before Ice Cream Sandwich --

7   Android versions before Ice Cream Sandwich did not

8   consume the importance of any threshold value being

9   background or foreground.

10   Do you recall that, using that phrase?

11   A   Yes, thank you for helping me to refresh my

12   memory.

13   Q   What did you mean by that?

14   A   In the sense of consuming, I was -- I am not

15   aware of portions of the Android operating system before

16   Ice Cream Sandwich consuming the importance and using a

17   threshold to determine foreground or background state.

18   I'm not aware of any examples.

19   Q   And by "consuming," do you just mean using or

20   calling?

21   A   Correct. Comparing the value and making -- the

22   operating system did not make a decision based on that.

23   Q   Okay. And by the way, I just used the phrase

24   "calling," where one piece of code, quote/unquote, calls

25   another.

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1   You understand what that means; right?

2   A   Correct.

3   Q   And just using your own words, what does that

4   mean?

5   A   To inspect -- to obtain and inspect a value.

6   Q   Is there other ways to explicitly have one

7   piece of code use another piece of code that you wouldn't

8   call calling?

9   MR. YANG: Object to form.

10   BY MR. MIRZAIE:

11   Q   I guess one example that we referred to earlier

12   is listening; correct?

13   You may have to -- you just --

14   (Simultaneous unreportable crosstalk.)

15   A   Can you repeat the question, please?

16   Q   Yes.

17   Another -- strike that.

18   One piece of code can call another piece of

19   code, and it can also listen to another piece of

20   code; correct?

21   A   Yes.

22   Q   Are there any other ways besides those two to

23   use -- for one piece of code to use another piece of code

24   or consume another piece of code?

25   MR. YANG: Object to form. Objection. Beyond

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1   the scope.

2   THE WITNESS: An example that comes to my mind

3   is that of omission where if the system knows a

4   particular circumstance and chooses not to inform an

5   application, like, of a change, that may be one example

6   where the app didn't request.

7   But that -- there is a change -- like, we're

8   not telling them about something that changed.

9   BY MR. MIRZAIE:

10   Q   Okay. Anything else -- strike that.

11   Any other examples where one piece of code can

12   use or consume another piece of code?

13   MR. YANG: Same objections.

14   THE WITNESS: Yeah, I'm being thoughtful in --

15   with my answer because it's a very broad area of computer

16   science that you're describing.

17   BY MR. MIRZAIE:

18   Q   Yeah. And to be clear, I'm just -- I could

19   limit my question to just your experience developing

20   Android code, not that that would change the breadth all

21   that much.

22   A   Another example could be if there's a memory

23   address that contains a value, it's not requiring the

24   application to call or invoke anything, but the data of

25   that memory address is available for the application to

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 1     inspect via a pointer as -- as a very general example.

 2        Q    Okay.  So consuming can include calling or

 3     invoking code, a memory inspection using a pointer,

 4     omission -- as you just described a few minutes ago --

 5     and also listening to a piece of code; correct?

 6             MR. YANG:  Same objections.

 7             THE WITNESS:  Yes, those are all accurate.

 8     However, I would not characterize them as exhaustive.

 9     BY MR. MIRZAIE:

10        Q    Can you think of any other examples of

11     consuming, just sitting here today?

12        A    I feel like I've stretched, you know, my

13     imagination to try to come up with those examples.

14        Q    Okay.  Final bit of, I guess, background or

15     housekeeping.

16             So have you ever worked with any Samsung

17     engineers since you started at Android in 2008?

18             MR. YANG:  Objection.  Beyond the scope.

19             THE WITNESS:  I have, yes.

20     BY MR. MIRZAIE:

21        Q    On how many occasions?

22             MR. YANG:  Same objections.  Sorry.  Same

23     objection.

24             THE WITNESS:  Numerous -- could you clarify if

25     those are in person or email or --
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1   BY MR. MIRZAIE:

2   Q   Let's start with in person.

3   If you had to estimate the number of days that

4   you met in person with Samsung engineers during your

5   ordinary course of work at Google, what would your

6   estimate be?

7   A   I would be able to count the number on one

8   hand. It's the number of days of interacting in person.

9   Q   If I ask you to broaden that by counting the

10 number of videoconferences, what would that number be,

11 just your estimate?

12   A   Various -- similar. I'd be able to count it on

13 one hand.

14   Q   And what about telephone calls with Samsung

15 engineers since you started at Google?

16   A   Similar. Like, be able to count them on my

17 hands. Like, you know, under -- under 10.

18   Q   And what about emails with Samsung engineers?

19 What's your just estimate of that?

20   A   Estimate would be between 100 to 1,000

21 interactions.

22   Q   Any other kind of interactions that you can

23 think of besides the four that we just mentioned?

24   A   Beyond email, we have code review tools, so

25 there can sometimes be conversations in our Gerrit Code

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1   Review tool.

2   Q   And about how many of those conversations have

3   you or your team have had with Samsung engineers, just

4   estimate?

5   MR. YANG: Object to form. Objection as beyond

6   the scope.

7   THE WITNESS: On behalf of myself, probably on

8   the order of 100. I cannot -- I do not -- I do not have

9   knowledge of my team's interactions to be able to

10   characterize it.

11   BY MR. MIRZAIE:

12   Q   And are you aware that Samsung and Google have

13   asserted that they have what's called a common interest

14   in this case?

15   MR. YANG: Objection. Beyond the scope.

16   (Simultaneous unreportable crosstalk.)

17   MR. YANG: Sorry. Grant, did you have an

18   objection too that --

19   MR. SCHMIDT: I just said objection, form.

20   MR. YANG: Okay. I'm objecting to form. I am

21   objecting beyond the scope.

22   And I caution the witness not to reveal any

23   information you may have learned through your attorneys.

24   But if you can answer it with information

25   that's not covered by privilege, feel free to do so.

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 1              MR. MIRZAIE:  And it's a "yes" or "no."  I

 2    don't think it could be covered by privilege at the

 3    yes-or-no level.

 4              But you may answer.

 5              THE WITNESS:  Could you, just to make sure I

 6    answer it accurately, the question, remind me?

 7    BY MR. MIRZAIE:

 8       Q    Yeah.

 9              Are you aware that Samsung and Google in this

10    case have asserted that they share a common interest?

11              MR. YANG:  Same objections.  Same caution.

12              THE WITNESS:  Beyond interactions with counsel,

13    I have no knowledge of that.

14              MR. MIRZAIE:  Okay.  I think it's 12:30.

15    Sorry.  I went a little long, but do you guys want to

16    take a lunch break?  12:30 where you are.

17              MR. YANG:  Yeah, that works for us.

18              THE WITNESS:  It does, yes.

19              MR. MIRZAIE:  Okay.  We can go off the record.

20              THE VIDEOGRAPHER:  We're going off the record.

21              This is the end of Media Unit 4.  The time is

22    12:28 p.m.

23              (A lunch recess was taken.)

24              THE VIDEOGRAPHER:  We're back on the record.

25              This is the beginning of Media Unit 5.  The
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1   time is 1:03 p.m.

2   BY MR. MIRZAIE:

3   Q   All right. So before the break, Mr. Sharkey,

4   we were talking about importance values indicative of an

5   application running in the foreground or background in

6   Cupcake or Donut source code.

7   Do you remember that?

8   A   I do recall that, yes.

9   Q   And during the period when Mr. Schmidt was

10   questioning you, I think you referred to life cycles of

11   activity running and states of various apps.

12   Do you recall that?

13   A   Yes, I do.

14   Q   And the importance value indicative of an

15   application running in the foreground or background,

16   that's the state you were referring to in your

17   questioning from Mr. Schmidt; correct?

18   A   They're closely related. The importance value,

19   I believe, is derived from some of the process states

20   that are calculated internally.

21   Q   Okay. So the process states are calculated

22   internally, and I guess what is derived from that are the

23   importance values.

24   Fair?

25   A   That's my recollection. I'd be happy to look

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1   at source code too to confirm.

2   Q   And the process states, do you recall just

3   sitting here right now what file or function those were

4   in?

5   A   I believe they're documented in

6   ActivityManager.java.

7   Q   And so the process state would be used to

8   calculate an importance value.

9   Is that fair?

10   A   That's my recollection.

11   Q   And so does every process state correspond to

12   some importance value -- some specific importance value?

13   A   I don't recall them being a 1-to-1 mapping.

14   But there's a lot of similar values between the two sets.

15   Q   Is it one-to-many going in either direction or

16   one-to-several going in either direction?

17   MR. YANG: Object to form.

18   THE WITNESS: I'd have to look at the source

19   code to recall accurately.

20   BY MR. MIRZAIE:

21   Q   What were the different process states as you

22   recall? Again, we're just talking about Cupcake and

23   Donut source code.

24   A   Yeah, I'd have to -- I'd have look at exactly

25   the Cupcake and Donut source code in front of me to

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1   answer that accurately as the states have changed and

2   evolved over time.

3   Q   Okay. Do you remember how many states there

4   were, just roughly how many?

5   A   I don't.

6   Q   Do you remember how many importance values

7   there were?

8   A   Based on what we looked at earlier this

9   morning, I believe we saw there were approximately five

10   or six.

11   Q   And you weren't shown any code this morning

12   consuming the process state; correct?

13   MR. SCHMIDT: Objection. Form.

14   MR. YANG: Same objection.

15   THE WITNESS: That's correct. I did not see

16   any code consuming the value.

17   BY MR. MIRZAIE:

18   Q   Now, I uploaded -- strike that.

19   When you say you did not see any code consuming

20   the value, are you referring to the importance value?

21   A   I believe that was your question. If it

22   wasn't, please -- please help clarify.

23   Q   I know they're closely related, to use your

24   words. But you didn't see any code -- strike that.

25   So would the code that calculates the

```
1    importance value, that would consume the process state

2    code, using your verbiage from earlier today?

3         A    That is -- I believe that's my recollection,

4    but I can answer that definitively by looking at the

5    source code.

6         Q    And just by your recollection, sitting here

7    today, is that the only instance of which you're aware of

8    where the process state code is consumed?

9              MR. YANG:  Object to form.

10   BY MR. MIRZAIE:

11        Q    Just sitting here today.

12        A    Can you refine which version of the source code

13   you're referring to?

14        Q    Yeah, good question.  Cupcake.

15        A    I'm not aware of any -- I'm not aware of who

16   the consumers might be in the Cupcake version.

17        Q    Okay.  You're not aware of who the consumers

18   might be.

19              Is that what you said?

20        A    That's correct.

21        Q    Was there an importance value determination in

22   Cupcake?

23        A    Yes, that's what we looked -- the source code

24   we looked at this morning, yes.

25        Q    And that importance value determination, I
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1   think you just mentioned was -- is made by consuming the

2   process state code we've been discussing; is that

3   correct?

4   A   That is my recollection.

5   Q   And other than that process for determining an

6   importance value calculation, are you aware of some other

7   process or procedure or function that's -- in Cupcake

8   that consumes the process state code, sitting here today?

9   MR. YANG: Object to form.

10   THE WITNESS: One example is the Linux kernel.

11   It would consume that importance -- like, it may consume

12   a lower version of the -- on the process state in order

13   to determine applications to kill when it needs more

14   memory.

15   BY MR. MIRZAIE:

16   Q   Okay. And can you, sitting here today --

17   strike that.

18   Sitting here today, are you aware of any code,

19   other than the code that calculates the importance value,

20   which consumes the process state for purposes of making

21   some separate determination of background versus

22   foreground, just sitting here today?

23   MR. YANG: Objection. Form.

24   MR. SCHMIDT: Same objection.

25   THE WITNESS: Not that I can recall off of the

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 1    top of my head.  But if we looked at the source code, we

 2    might find examples.

 3    BY MR. MIRZAIE:

 4        Q     Okay.  I wanted to -- I want to get back to

 5    that.  If you look in your ShareFile, I've added another

 6    exhibit, which is Exhibit 38.  If you could pull that up.

 7              Oh, I am sorry.  Exhibit 39.  I'm sorry.

 8              (Exhibit 39 marked.)

 9              THE WITNESS:  Okay.  I have it open.

10    BY MR. MIRZAIE:

11        Q     Do you recognize this as one of your patents?

12    And by that I mean a patent that you're named an inventor

13    on.

14        A     Yes, I recognize this patent as one that I'm a

15    named inventor on.

16        Q     Thanks.

17              MR. MIRZAIE:  Just for the record, the patent

18    number for Exhibit 39 is 9,154,550.

19    BY MR. MIRZAIE:

20        Q     Do you see that?

21        A     Yes, I do.

22        Q     You're listed here as an inventor along with

23    some other co-inventors; correct?

24        A     That's accurate, yes.

25        Q     Do any of those co-inventors still work at
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1   Google, by the way?

2   MR. YANG: Just I'll have a standing objection

3   to questions about this patent as being beyond the scope.

4   MR. MIRZAIE: Okay.

5   THE WITNESS: Unfortunately, I don't have

6   accurate information to know if they're still employees.

7   BY MR. MIRZAIE:

8   Q   But you did work with them at some point in

9   your career.

10   Fair?

11   A   Yes.

12   Q   And, in fact, you worked with the co-inventors

13   in your development of Network Policy Manager, which we

14   touched on briefly this morning.

15   Fair?

16   A   Yes, we collaborated on the design, yes.

17   Q   Okay. And the date of this patent -- you see

18   it was filed on October 16th, 2012.

19   This is on Line 22, right on the first page

20   there.

21   A   Unfortunately, I don't see Line Number 22.

22   Q   It's not exactly a line number. That was kind

23   of a misnomer. If you look at the front page, kind of

24   halfway down on the left column, there's a number 22 that

25   says "file" next to it.

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1   A   Yes, I see that.

2   Q   Okay. And you see that the patent was filed on

3   October 16th, 2012?

4   A   Yes, I see that.

5   Q   And you see that right below that, there's

6   another number, 60, so it's not really line numbers.

7   You're right.

8   Line number 60, it says that there's some

9   related applications, which are provisional,

10   quote/unquote, applications that were filed in 2011 and

11   2012 respectively?

12   A   Yes, I see that line.

13   Q   Okay. And does that refresh your recollection

14   about when some of the ideas captured in this patent were

15   conceived by you and your co-inventors at Google?

16   MR. YANG: Object to form.

17   THE WITNESS: It refreshed my memory. Yes,

18   like -- yes, thank you for reminding me.

19   Yes, I'm aware of this patent.

20   BY MR. MIRZAIE:

21   Q   Okay. Just to refresh your memory a little bit

22   more, maybe we could jump to Page 18 in the document.

23   By the way, before we get into the -- some of

24   the substance here, you were involved at some level with

25   the prosecution of this patent; fair?

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 1              MR. YANG:  Object to form.

 2              And, also I caution the witness not to reveal

 3      any communications he might have had with any attorneys

 4      in preparing this patent.

 5              MR. MIRZAIE:  It's "yes" or "no."

 6              THE WITNESS:  Could you give me a working

 7      definition of the word "prosecute."

 8      BY MR. MIRZAIE:

 9         Q     Yeah.  Sorry, that was kind of a legal term.

10              But the prosecution of a patent is the -- among

11      other things, the filing at the patent office of the

12      patent, and what follows that typically are rejection of

13      claims and responses to rejections of claims and so

14      forth.

15              You were involved, at least to some degree, in

16      parts of that process, including just signing the

17      declarations for the patent to begin with.

18              Fair?

19         A     Yes.

20         Q     Okay.  And do you recall something called a

21      duty of candor in that declaration?

22         A     I do not recall.

23         Q     Okay.  But at any rate, you wouldn't attempt to

24      mislead the public or lie, you know, to the public in a

25      patent.  Fair?
```

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1   A   That is a correct statement.

2   MR. YANG: I object to form.

3   BY MR. MIRZAIE:

4   Q   So now we could get through -- if we look at

5   Column 1 -- let me know when you're there.

6   There's a section called Background that spans

7   from Column 1 to Column 2.

8   Do you see that?

9   A   I do, yes.

10   MR. YANG: Mr. Sharkey, if you need time to

11   review the document in totality, please feel free to do

12   so.

13   BY MR. MIRZAIE:

14   Q   So at Line 28 in Column 1, there's a sentence

15   that begins with "current computing devices."

16   Do you see that?

17   A   I do see that.

18   Q   And what this says is, "Current computing

19   devices, however, do not provide fine-grained visibility

20   and control of network usage patterns on individual's

21   computing device where the network data flows originate."

22   Did I read that correctly?

23   A   Yes, you read it accurately.

24   Q   And by the way, I think we touched on this a

25   little bit earlier today, but Android is a Linux-based or

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 1     Linux-derived operating system; correct?
 2         A     Yes, that's correct.
 3               MR. YANG:  Object as beyond the scope.
 4               Just give me a chance to object before you
 5     answer.  It's okay.
 6     BY MR. MIRZAIE:
 7         Q     Okay.  And if we scroll down on Column 1, from
 8     Lines 49 through about 57, do you see that -- or 58, do
 9     you see that paragraph there?
10         A     I do, yes.
11         Q     What this says -- the last sentence says, "From
12     the user's perspective, it is not clear which application
13     or feature of the application is causing the data usage
14     in the wireless network."
15               Did I read that correctly?
16         A     Yes, the last sentence is correct.
17         Q     And the sentence right after that says, "The
18     problem of attributing the data usage of an application
19     is further complicated by the fact that sometimes
20     separate applications, e.g. a mediaserver, download
21     manager, or operating system (OS) on the mobile device
22     provide a network data exchange service to the
23     application."
24               Do you see that?
25         A     I do.
```

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1   Q   And that was true at least as of 2011 when you

2   and your colleagues began drafting this document.

3   Fair?

4   MR. YANG: Object to form.

5   THE WITNESS: Is it okay if I take a moment to

6   read the larger context?

7   BY MR. MIRZAIE:

8   Q   What do you mean by "larger context"? Just the

9   rest of the paragraph?

10   A   No, the section of background.

11   Q   Sure.

12   A   Okay. Thank you.

13   Q   Whenever you're done, just let me know, and

14   I'll have a question.

15   A   I will.

16   Thank you for giving me that time to review it.

17   I'm ready for your question.

18   Q   Okay. I guess one follow-up question I had

19   was: You're familiar with media servers, download

20   managers, and obviously operating system on a mobile

21   device providing a network data exchange service to an

22   application; correct?

23   A   Yes.

24   Q   We were discussing earlier today how apps can

25   request network access and a network data exchange.

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```
 1                    Do you recall that?

 2        A      Yes, I recall that.

 3        Q      And you gave a description of that.  In -- I

 4    think in typical operation, an app would request that

 5    access to the network via the operating system on the

 6    mobile device; correct?

 7        A      It would request it via the internet -- the

 8    user's permission, definition in their manifest saying

 9    they desire to use the internet permission.

10        Q      Got it.

11                    In that instance, would the operating system

12    provide -- be the one providing the network data exchange

13    service to the application, or would it be a media server

14    or download manager?

15        A      It could be both.

16        Q      Got it.

17                    And if we look at Column 2 right at the very

18    top; let me know when you're there.

19        A      I'm ready.

20        Q      Here you and your co-inventor stated as of 2011

21    that to control -- "likewise, to control data usage

22    limits need to be imposed on the application requesting

23    the network data exchange service but not the separate

24    application providing the network data exchange service."

25                    Did I read that correctly?
```

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1   A   You did.

2   Q   In the following paragraph, you refer to

3   associated overhead in terms of system setup costs on

4   Line 7 through 15.

5   Do you see that?

6   A   I do.

7   Q   That's a fair statement as of 2011; correct?

8   MR. YANG: Object to form.

9   THE WITNESS: Yes, it's accurate.

10   BY MR. MIRZAIE:

11   Q   And starting at Line 15, you and your

12   co-inventor state that, "Applications, however, can

13   themselves not determine how much data they are using as

14   the payload they want to transfer actually incurs an

15   overhead caused by the protocols used."

16   Do you see that?

17   A   I do.

18   Q   And as of the earliest provisional here, which

19   I think is in October 2011, that was a fair

20   statement; correct?

21   A   Yes.

22   Q   And in Line 26, you and your co-inventor state

23   that, "In all of these cases, it is difficult for the

24   developer to know which parts of the application need to

25   avoid costly traffic and difficult for the end user to

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1   apply limitations on specific portions of an

2   application's traffic."

3   Do you see that?

4   A   I do.

5   Q   That wasn't misleading in 2011; correct? That

6   was a fair statement in 2011; correct?

7   MR. YANG: Object to form.

8   THE WITNESS: Yes, it was an accurate

9   statement.

10   BY MR. MIRZAIE:

11   Q   And further down, you reference some tools in

12   the next paragraph, and on Line 39, you and your

13   co-inventor state that, "None of these tools or

14   applications are able to distinguish which application or

15   part of an application is causing the data usage and when

16   those applications are using services like download

17   managers."

18   Did I read that correctly?

19   A   Yes, you did.

20   Q   And that was a fair and non-misleading

21   statement as of 2011; fair?

22   A   Yes, that's correct. That's an accurate

23   statement.

24   Q   And then the next sentence is, "Due to this

25   ambiguity, tools and applications cannot attribute the

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 1    data usage to a specific application or parts of the

 2    applications.  Accordingly, it is impossible to set a

 3    quota on a specific application and on specific parts of

 4    the applications."

 5              Did I read that correctly?

 6       A    Yes, you read it correctly.

 7       Q    At the very end there in Line 54, you say,

 8    "Accordingly, there is a need for determining,

 9    controlling, adapting, and reporting data usage for

10    specific application and features of applications that

11    are running on computing devices and exchanging data with

12    networks."

13              Did I read that correctly?

14       A    Yes, you did.

15       Q    That was a fair statement as of 2011.

16              Fair?

17       A    Yes.

18       Q    Now, if we go a little bit further into the

19    summary -- right below that there's a heading named

20    Summary.

21              Do you see that?

22       A    I do.

23       Q    You refer -- this is on the next page now -- to

24    policies governing data being exchanged over the network.

25              Do you see that?
```

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1   A   Which line?

2   Q   So if you look at Column 2, the bottom line

3   refers to a tag, and then it says -- this is the very

4   bottom line -- "Wherein the tag identifies the

5   application or features of the application and identifies

6   a policy governing data being exchanged over the

7   network."

8   Did I read that correctly?

9   A   Unfortunately, I still -- I still haven't found

10   where you're reading from.

11   Q   Sorry about that.

12   So Column 2 -- do you see the Number 2 at the

13   very top?

14   We were just there in the background with the

15   "accordingly."

16   A   So I see the title -- I see the title of the

17   section, sorry --

18   Q   Right.

19   A   -- at the bottom of Column 2.

20   Q   Perfect. So if you go down to the very bottom

21   of that, you see the last line refers to a tag?

22   A   Yes, yes.

23   Q   Okay. And the rest of the sentence is,

24   "Wherein the tag identifies the application or features

25   of the application and identifies a policy governing data

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1   being exchanged over the network."

2   Do you see that?

3   A   I don't. I'm looking for the word "policy,"

4   and --

5   Q   It's on the next page, you know, Column 3. I

6   was just -- I kept reading down to "policy." It's at the

7   first line of Column 3.

8   A   Okay. Yeah. I think -- I think I see where

9   we're quoting from, spanning between them.

10   Q   Okay. So did I read that correctly? I can

11   read it again.

12   A   Yeah, if you can read it correct -- read it

13   again, please.

14   Q   Sure.

15   So, again, just so you can follow, this is the

16   very bottom of Column 2, it's the very last line, and it

17   bleeds over to Column 3, Lines 1 through 2.

18   It reads, "tag" -- and this is in the middle of

19   the sentence, but "tag, wherein the tag identifies the

20   application or features of the application and identifies

21   a policy governing data being exchanged over the

22   network."

23   Did I read that correctly?

24   A   Yes.

25   Q   And here it -- you and your co-inventors refer

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1   to a "policy governing data being exchanged over the

2   network;" correct?

3   A   Yes.

4   Q   And by the way, October 2011, if I recall

5   correctly, that's -- I think coincides with the same time

6   Ice Cream Sandwich was released, roughly.

7   Does that sound fair?

8   A   That sounds accurate. This patent would be --

9   have been filed as part of things we built in Ice Cream

10   Sandwich.

11   Q   By the way, in Ice Cream Sandwich, I think, is

12   when you and your team had created chunks of what you

13   referred to earlier this morning, which is Network Policy

14   Manager.

15   Fair?

16   A   That's accurate. Yes.

17   Q   And so this policy is referring to network

18   policy -- the network policy that was derived by you and

19   your team?

20   MR. YANG: Object to form.

21   THE WITNESS: That's one place in the Network

22   Policy Manager where that's expressed. Other pieces of

23   the policy may have been implemented in the Linux kernel.

24   BY MR. MIRZAIE:

25   Q   Got it.

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1   Okay. And I know that network policy --

2   Network Policy Manager and Network Policy Manager

3   Service, like other portions of Android code evolved over

4   time -- you and your team added to it over time; correct?

5   A   Yes, that's correct.

6   Q   But the work on that started in mid-2011 with

7   the first pieces of code committed; correct?

8   MR. YANG: Object to form.

9   THE WITNESS: I would have to go back to the

10   actual source code commits, but that sounds accurate.

11   BY MR. MIRZAIE:

12   Q   And we might pull some of those up -- we will

13   pull some of those up in a moment.

14   You said -- strike that.

15   So here it refers to a policy governing data

16   being exchanged over the network; correct?

17   A   Yes, I see that phrase.

18   Q   And, in fact, it's a tag identifying a policy

19   governing data being exchanged over the network; correct?

20   A   Indirectly, indirectly.

21   Q   And the tag is a -- that's a piece of code in

22   the source code; correct?

23   MR. YANG: Object to form.

24   THE WITNESS: The tag for this feature is a

25   combination of two numbers. One of the numbers

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1   reference -- referencing the application UID that should

2   be blamed for the network traffic, and the second tag

3   being an informational note that the developer can leave

4   for themselves to determine where the traffic originated

5   from.

6   BY MR. MIRZAIE:

7   Q   Got it.

8   And the policy here -- well, strike that.

9   With respect to Network Policy Manager, that

10   was something that was committed to source code,

11   obviously; correct? It's a file in source code; correct?

12   A   Yes.

13   Q   And here it says it's a policy -- in the patent

14   it says, "a policy governing data being exchanged over

15   the network."

16   Do you see that?

17   A   I do.

18   Q   Am I correct to understand that as a policy in

19   the source code governing -- strike that.

20   What do you mean by "policy" here? Is it just

21   a set of rules, essentially?

22   MR. YANG: Object to form.

23   THE WITNESS: I would say policy as a broad

24   definition is a desired behavior, which then rules may

25   fall out of -- concrete rules may fall out of a policy.

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 1     BY MR. MIRZAIE:

 2          Q      And in the case of Network Policy Manager,

 3     there were concrete rules in the source code; correct?

 4               MR. YANG:  Object to form.

 5               THE WITNESS:  Yes, there were.

 6     BY MR. MIRZAIE:

 7          Q      Those rules would be enforced by Android

 8     itself; correct?

 9               (Simultaneous unreportable crosstalk.)

10     BY MR. MIRZAIE:

11          Q      Correct?

12          A      To the best -- to the best of my recollection,

13     the rules were pushed via iptables, and the Linux kernel

14     was the one that actually enforced those rules.

15          Q      Just as a comparison, so I understand a little

16     bit better, that was not true of the, I think,

17     recommended best practice, to use your phrase, in the

18     record of -- the best practices that you were referring

19     to in your IO presentation in 2008; fair?

20               MR. YANG:  Object to form.

21               THE WITNESS:  Could you repeat the question?

22     BY MR. MIRZAIE:

23          Q      Yes.

24               So I believe your prior answer on the record

25     was:  To the best of my recollection, the rules were
```

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1   pushed via iptables and the Linux was the one that

2   actually enforced those rules.

3   Do you remember saying that?

4   A   Yes.

5   Q   And my question --

6   MR. YANG: Hold on a second.

7   Object to form.

8   BY MR. MIRZAIE:

9   Q   And my question was: That process was not true

10   of the, quote/unquote, recommended best practices that

11   you referred to in your IO presentation in 2008; correct?

12   MR. YANG: Objection. Form.

13   THE WITNESS: If what you're asking -- I don't

14   believe there were usages of iptables in that way in the

15   Cupcake release.

16   BY MR. MIRZAIE:

17   Q   Without relying on third-party app developers

18   to write additional code, Linux wouldn't be enforcing

19   those recommendations itself?

20   By that I mean, the recommendations that you

21   discussed earlier today mentioned in your 2008 IO

22   presentation; correct?

23   MR. YANG: Object to form.

24   THE WITNESS: Yes, that's an accurate

25   statement.

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 1    BY MR. MIRZAIE:

 2        Q     Okay.  So if we go further -- now maybe we

 3    could take a look at -- let me add another exhibit, if

 4    you don't mind.

 5              While I'm adding this, have you heard of

 6    Greg Raleigh before?

 7        A     Greg Raleigh?

 8        Q     Yeah.

 9        A     Name does not ring a bell.

10        Q     He's the inventor on Headwater's patents in

11    this case.

12              Does that help in any way?

13        A     Perhaps there was a list of names that I was

14    asked to search for in my subpoena, but I had not heard

15    of any of those people before the subpoena.

16        Q     In the prosecution of your patents, his patent

17    came up.  It was cited by the examiner; correct?

18        A     I'm not -- I don't have knowledge of that.

19        Q     Well, if you go back to Exhibit 39, and -- at

20    the title page again.  Let me know when you're there.

21        A     Okay.  I'm on the title page.

22        Q     This is sort of the second -- rather, the right

23    half of the title page, if we go to -- there's a number

24    there -- a Reference Number 56 and right next to it,

25    there's a heading References Cited.
```

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1   Do you see that?

2   A   I do, yes.

3   Q   And there, do you see underneath that there's a

4   reference to a patent application by a Raleigh, like the

5   city in North Carolina?

6   A   Yes, the fourth on the list. I see that.

7   Q   Right.

8   So does that help at all to refresh your

9   recollection that you and your co-inventors were actually

10   made aware of Greg Raleigh's patent applications when you

11   were prosecuting these patents?

12   A   Unfortunately, it does not refresh my memory.

13   I don't -- I still have no long -- no recollection of

14   this being brought to my attention.

15   Q   Got it. Okay. That's okay. It's a long time

16   ago.

17   MR. MIRZAIE: So let me add some additional

18   documents. And we'll call this Exhibit 40.

19   (Exhibit 40 marked.)

20   BY MR. MIRZAIE:

21   Q   So if we go back to your ShareDrive. You

22   referred earlier today to, I think, code commits and

23   discs and so forth.

24   Do you recall that generally?

25   A   Yes, I do.

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1   Q   All right. So I just added an Exhibit 40. If

2   you could pull that up, and we could talk about it a

3   little bit. Let me know when you have that up.

4   A   I do have it up.

5   Q   Okay. Great. So this is a code commit much

6   like the ones we looked at today. It's a Git, G-I-T,

7   commit; correct?

8   A   That's accurate, yes.

9   Q   You described earlier today that Git is a

10   source code management system.

11   Do you remember that?

12   A   Yes, that's accurate.

13   Q   And a commit is an atomic change, a

14   contribution; right?

15   A   Yes.

16   Q   And the summary that's usually in the box is a

17   summary by the author; correct?

18   A   That's accurate, yes.

19   Q   Here you're the author and the

20   committer; correct?

21   A   That's accurate, yes.

22   Q   And this is something that's kept as a business

23   record for Google or Android; correct?

24   MR. YANG: Hold on a second.

25   Object to form. Objection as beyond the scope.

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1   I just want to note here -- Counsel, are you

2   representing that this is something from the

3   androidsource.com website, or is this something from

4   another website?

5   MR. MIRZAIE: I think this particular

6   document -- we can go to the other one -- you know, the

7   other versions of it, but the HTTPS is right there at the

8   upper right-hand corner.

9   MR. YANG: Upper right-hand corner -- oh, I

10   see. So this is -- you downloaded this from

11   gerrit.pixelexperience.org; is that right?

12   MR. MIRZAIE: Right. But we can go to other

13   versions too, if you'd like, later.

14   But can I continue my question?

15   MR. YANG: Yeah, I just wanted to make sure

16   that I understood what you were representing this as

17   being.

18   BY MR. MIRZAIE:

19   Q   Do you recall, you know, this document,

20   Mr. Sharkey?

21   A   May I take a moment to look at it?

22   Q   Sure.

23   A   Okay. I finished reviewing my -- my summary

24   commit -- the summary of the commit.

25   Q   And what's that commit number, by the way,

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1   right -- you see where it says author and committer and

2   your name is there and your email is there?

3   A   Yes.

4   Q   There's a commit number right above the author

5   name.

6   Do you see that?

7   A   Is it a large hexadecimal string?

8   Q   Yes. Yes.

9   A   Yes, I see that.

10   Q   Does that follow some type of convention just

11   so I learn a little bit more about how the commits are

12   numbered?

13   MR. YANG: Object as beyond the scope.

14   THE WITNESS: My understanding of the Git

15   source code management system is that those are hashes

16   that are automatically derived and calculated by the Git

17   source control system.

18   BY MR. MIRZAIE:

19   Q   Got it.

20   At any rate, with this document in your

21   summary -- first of all -- strike that.

22   The date right next to author is May 3rd, 2011.

23   Do you see that?

24   A   I do.

25   Q   It's timestamped as well, I think. For

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 1    committer, right next to that, it's May 13th, 2011.

 2             Do you see that?

 3       A    I do.

 4       Q    What's the difference between those two dates,

 5    generally?

 6             MR. YANG:  Object as beyond the scope.  Object

 7    to form.

 8             THE WITNESS:  All the code that's submitted

 9    into the Android project needs to go through peer review.

10    And so in this case, the SEAL was originally authored or

11    created on May 3rd.  And then it was -- after peer review

12    had completed, it was finally merged into to become an

13    official part of the tree on May 13th.

14             MR. MIRZAIE:  Got it.

15             Okay.  Actually, it's identical, but I just

16    added as Exhibit 41 the same -- what we believe to be the

17    same document, but the website that it was pulled from

18    was android.googlesource.com.

19             So maybe we can go to Exhibit 41.

20             (Exhibit 41 marked.)

21             THE WITNESS:  I have that loaded.

22    BY MR. MIRZAIE:

23       Q    Great.  This is the same document we were just

24    looking at.  I mean, as far as you could tell this is --

25    you know, no tricks here.
```

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1   But sitting here in the first few seconds, it

2   appears to be the same; correct?

3   MR. YANG: Object to form.

4   Take your time.

5   THE WITNESS: Please give me a moment.

6   BY MR. MIRZAIE:

7   Q   Sure.

8   A   Unfortunately, I disagree. They're not

9   identical.

10   Q   Setting that aside, though, this is -- assuming

11   we didn't doctor it, this is from

12   android.googlesource.com; right?

13   MR. YANG: Object to form. Object as beyond

14   the scope.

15   (Reporter clarification.)

16   BY MR. MIRZAIE:

17   Q   Android.googlesource.com; correct?

18   A   Just to clarify, Exhibits 40 and 41 are not --

19   are not -- maybe to summarize it better, my observation

20   is that Exhibit 41 is only a small portion of Exhibit 40.

21   Q   Got it. Okay. That's helpful. That is

22   helpful.

23   So Exhibit 41, though, is from

24   android.googlesource.com?

25   MR. YANG: Hold on a second.

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```
 1              Are you asking him to confirm that this is from

 2      that website?

 3              MR. MIRZAIE:  Strike that.

 4      BY MR. MIRZAIE:

 5          Q    Sir, at the very top, you see where it says

 6      android.googlesource.com?

 7          A    Yes.

 8              (Reporter clarification.)

 9      BY MR. MIRZAIE:

10          Q    android.googlesource.com.  Do you see that?

11          A    Yes.

12          Q    And what is that?

13          A    It's a public website where Android makes its

14      source code available.

15          Q    Okay.  There is, I believe, the same commit

16      number that we just referenced on Exhibit 40 here as

17      well.

18              Do you see that?

19          A    Yes, I do.

20          Q    And, again, you're the author, same -- and

21      committer and same dates listed here of May 3rd and

22      May 13th, 2011; correct?

23          A    That's accurate, yes.

24          Q    So here in your comment -- by the way, so

25      comments are something that obviously the public and
```

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```
 1    developers will see; correct?

 2        A    It's available to them, yes.

 3        Q    Okay.  And to be more accurate, to use your

 4    verbiage, what's in the box underneath the word "parent"

 5    is your summary of the commit; correct?

 6        A    Yes, that's accurate.

 7        Q    And the summaries are intended to be perhaps

 8    high-level but accurate summaries and not

 9    misleading; correct?

10        A    Yes, that's accurate.

11        Q    And here it says, "First pass at NetworkPolicy

12    and activity tracking"; correct?

13        A    Yes.

14        Q    And so does this -- strike that.

15             So around May 2011, you took a first pass at

16    network policy; fair?

17             MR. YANG:  Hold on a second.

18             Object to form.  Object as beyond the scope.

19    BY MR. MIRZAIE:

20        Q    You can answer.

21        A    All this is -- go ahead.

22        Q    You can answer is all I said.

23        A    This is the first manifestation.  Some of these

24    ideas were likely being designed or discussed before this

25    time amongst colleagues.
```

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1   Q   Roughly how long before this time would you say

2   they were being discussed amongst colleagues?

3   MR. YANG: Object to form. Object as beyond

4   the scope.

5   MR. MIRZAIE: Well, strike that. I'll ask

6   another question.

7   BY MR. MIRZAIE:

8   Q   The discussion amongst colleagues that you

9   reference in your last answer, you're not referring to

10   any public statements, instead you're just referring to

11   internal Android engineer meetings and

12   conversations; correct?

13   MR. YANG: Same objections.

14   THE WITNESS: Yes, that's an accurate

15   statement.

16   BY MR. MIRZAIE:

17   Q   You're not -- strike that.

18   And so as of this date, May 2011,

19   NetworkPolicyManager.java, that was not yet in any

20   Android release; fair?

21   A   That's accurate.

22   Q   And if we look at the summary of what you say

23   right below the first sentence is, "New system service

24   that maintains low-level network policy rules and

25   collects statistics to drive those rules."

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1   Do you see that?

2   A   I do, yes.

3   Q   And that's accurate; correct?

4   A   Yes.

5   Q   And you say, "Will eventually connect to

6   netfilter kernel module through NetworkManagementService

7   and 'netd'."

8   Do you see that?

9   A   Yes.

10   Q   And what's netd?

11   A   Netd is a low-level daemon, which is

12   responsible for configuring network connections with the

13   Linux kernel.

14   Q   You're familiar with the acronym UID; correct?

15   A   Yes. It's used in the Linux kernel, yes.

16   Q   Got it.

17   Is that something that netd would generate in

18   Network Policy Manager as a result of -- or as a result

19   of Network Policy Manager?

20   MR. YANG: Object to form. Object as beyond

21   the scope.

22   THE WITNESS: When you say -- when you use the

23   word "generate," UIDs are defined, like, when an

24   application is installed elsewhere on the software.

25   ///

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1   BY MR. MIRZAIE:

2   Q   And there's a unique UID for each application;

3   correct?

4   A   That's accurate, with some caveats around an

5   advanced feature called shared user ID. But that's --

6   it's a rarely used feature.

7   Q   Got it.

8   Okay. Right below that, you said, "Begin

9   tracking foreground activities in ActivityManagerService,

10   which is updated as part of OOM adjustment."

11   Do you see that?

12   A   I do.

13   Q   So prior to -- strike that.

14   So starting with this first pass, the system

15   began tracking foreground activities in ActivityManager

16   service; correct?

17   MR. YANG: Object to form. Objection as beyond

18   the scope.

19   THE WITNESS: May I take a moment to look at

20   the end commit in its entirety?

21   BY MR. MIRZAIE:

22   Q   Of course.

23   A   Thank you.

24   Okay. I believe I'm ready for your question.

25   Q   Hold on. Let me -- sorry, pulling up the doc

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1   again.

2   So as of this -- strike that.

3   So as of this date, the system began "tracking

4   foreground activities in ActivityManagerService, which is

5   updated as part of OOM adjustment"; correct?

6   MR. YANG: Object to form. Object as beyond

7   the scope.

8   THE WITNESS: That's an accurate repeating of

9   what the commit description says, yes.

10   BY MR. MIRZAIE:

11   Q   And OOM is out of memory; is that correct?

12   A   Yes, it is.

13   Q   What were you referring to by OOM adjustment?

14   A   So this relates back to some of those

15   constants, the importance value that we discussed earlier

16   in Cupcake. Since the beginning of Android, we've always

17   calculated those OOM adjust values to describe the

18   relevance importance of an application.

19   Q   Okay. And the last sentence says, "Eventually

20   a network policy of POLICY_REJECT_BACKGROUND will reject

21   network traffic from background processes."

22   Do you see that?

23   A   I do.

24   Q   And eventually you did create a network policy

25   of POLICY_REJECT_BACKGROUND; correct?

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1   A   I believe so. It may have a slightly different

2   name. I don't recall.

3   Q   In any event, when you created that policy,

4   that was actually a piece of code that gets

5   called; correct?

6   MR. YANG: Object to form.

7   THE WITNESS: Not a piece of code that's

8   called. It's a configuration state that is stored.

9   BY MR. MIRZAIE:

10   Q   Got it.

11   Stored in the code; correct?

12   A   Stored in memory and written to disc.

13   Q   Got it.

14   And when it's stored in memory and written to

15   disc, how would it reject network traffic from background

16   processes?

17   A   Network Policy Manager would take the desired

18   policy. It would blend it together with its

19   understanding of the current system state to derive the

20   relevant rules to push down to netd for the kernel to --

21   to apply to the kernel.

22   Q   All of that -- strike that.

23   None of what you just mentioned would rely on

24   third-party app developers writing additional code or

25   respecting what you call recommendations for best

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1   practices.

2   Am I correct in that?

3   A   That's an accurate statement, yes.

4   Q   Thanks. If we go to -- I think this might be

5   the next one, but I just uploaded an Exhibit 42 --

6   actually, it might not have uploaded yet. I'm sorry

7   about that.

8   (Exhibit 42 marked.)

9   BY MR. MIRZAIE:

10   Q   All right. So let's check it now if you have

11 it. It should be there.

12   A   Yes, I found it.

13   Q   Okay. This is another Git commit by you in

14 May 2011; correct?

15   A   Yes, that looks accurate.

16   Q   Okay. And, again, assuming no doctoring here,

17 do you see where it was -- at the upper right-hand

18 corner, it's from android.googlesource.com?

19   A   Yes, I see that.

20   Q   And by the way, what's the process for you to

21 add these commits, if you could just very briefly explain

22 that.

23   A   When you say add a commit, to change the code

24 of the operating system?

25   Q   Right.

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1   A   So when an engineer desires to make a change,

2   they make a commit locally on their workstation. And

3   they upload it to a code review tool. That's the peer

4   review that I referred to earlier.

5   And that commit may remain in review for

6   anywhere from hours to days. And assuming your peers are

7   happy with it, in its design, you hit a submit button,

8   and then it is merged at that moment in time to become

9   part of the official Android source code tree.

10   Q   Got it. That's helpful.

11   Okay. So if you look at this commit -- and I

12   think this was just a few days after the last commit.

13   What you say here in your summary is, "APIs to profile

14   network usage for current UID."

15   Do you see that?

16   A   I do.

17   MR. YANG: Counsel, question to make sure I

18   have the right exhibit here.

19   Is the exhibit supposed to be the complete

20   commit, or is it just the first page, or is it just my

21   download that has the problem?

22   MR. MIRZAIE: It's a one-page document, so --

23   MR. YANG: The original commit was one page? I

24   just want to make sure this is a complete commit.

25   MR. MIRZAIE: Yeah, I'm not sure. We'll check

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```
 1    during a break and do, you know, some additional

 2    questioning, if necessary.

 3              MR. YANG:  So, Counsel, when you --

 4              MR. MIRZAIE:  Yes.

 5              MR. YANG:  When you previously said there were

 6    no -- assuming there are no changes to this commit, you

 7    just meant to the printed -- the first page here, that

 8    there are no changes?

 9              MR. MIRZAIE:  Yeah.

10              MR. YANG:  Because it's incomplete.  Okay.  All

11    right.  Or potentially it's incomplete.

12    BY MR. MIRZAIE:

13       Q    So if we look at the summary, sir, and here, it

14    states, "APIs to profile network usage for current UID."

15              Do you see that?

16       A    Yes.

17       Q    We'll pull up the lengthier document later, if

18    necessary.  Hold on one second.

19              And current UID is referring to -- is that

20    referring to a current app?

21       A    May I have a moment to look at the larger

22    commit in its full context?

23       Q    Sure.

24              MR. YANG:  Counsel, I have limited knowledge of

25    this, but is this a diff or a commit or is there a
```

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1   difference? Only because I see here on the first page it

2   references a diff, and I'm not sure if that makes this a

3   commit or not a commit.

4   MR. MIRZAIE: The witness can answer that

5   better than I can. I can ask him that question. That's

6   fine.

7   MR. YANG: No, no, that's okay. Looking at the

8   first page, I'm just trying to figure out whether or not

9   us referring to it as a commit is an accurate thing when

10   you said this was a commit.

11   BY MR. MIRZAIE:

12   Q   When you're done, Mr. Sharkey, I'll ask you

13   some questions about diffs.

14   A   Yes, I'm ready for your question.

15   Q   So what's the difference between a diff and a

16   commit, if any, I guess?

17   A   Yeah, a diff in Git nomenclature is a

18   collection of source code -- a description of the source

19   code which has been added, removed, or changed.

20   Q   Okay.

21   A   That diff -- that diff of, like, multiple files

22   combined together, like, of all the changes -- the deltas

23   that someone wants to make, that is something we refer to

24   as a commit.

25   Q   Understood. Okay. So I'll perhaps more

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1   accurately refer to this as diff.

2   Do you see the diff at the upper left-hand

3   corner right there?

4   A   Yes.

5   Q   Okay. Back to the diff, so the first sentence

6   of your summary refers to a current UID.

7   Do you see that?

8   A   I do.

9   Q   And is that referring -- the UID there, is that

10   referring to a specific app, kind of piggybacking on the

11   explanation you gave a few minutes ago?

12   A   I can accurately answer that based on opening

13   the full context of that commit.

14   Q   Okay. Is there a way for you to do that?

15   A   Yes. So I've opened the larger commit. So

16   it's using information as part of that commit beginning

17   an eedc. So if I click that link at the top of your

18   exhibit, that loads the entire commit --

19   Q   Okay.

20   A   -- on the public web.

21   Q   Okay.

22   A   And so as I look at that, that helps refresh my

23   memory and give me the context of what current means to

24   answer your question.

25   Q   Okay. Can you answer my question?

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1   A   So when an application calls the method, start

2   data profiling, which is new, it is declared in that

3   commit, that calls another method, get network stats for

4   UID, and the implementation of that method uses

5   process.myUID.

6   Q   Got it.

7   A   So as someone is calling through that code

8   path, it is requesting the network statistics based on

9   whoever is calling.

10   Q   Got it.

11   And that didn't exist prior to 2011; correct?

12   MR. YANG: Object to form. Object as beyond

13   the scope.

14   THE WITNESS: This exact code did not exist.

15   The concept did exist from what I recall.

16   BY MR. MIRZAIE:

17   Q   Okay.

18   A   There's an API called Traffic Stats.

19   Q   Okay. Now --

20   MR. YANG: Counsel, we've been going for an

21   hour, so whenever you're at a good breaking point we can

22   take a break.

23   MR. MIRZAIE: Yeah, maybe just a few more

24   minutes, if that's okay.

25   THE WITNESS: I'm okay.

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```
 1              MR. MIRZAIE:  Let's see here.  So one more doc

 2    here.  And it is a diff, Exhibit 43.

 3              (Exhibit 43 marked.)

 4    BY MR. MIRZAIE:

 5        Q     Let me know when you have that open.

 6        A     I have it open.

 7        Q     And this -- you recognize this diff?

 8        A     It's likely -- yes, it's something I wrote.

 9    I'm reminding myself -- refamiliarizing myself with it.

10        Q     Sure.  And by the way, if we see diffs, you

11    know, that are pulled from android.googlesource.com, they

12    would be adding and using the same process that you

13    described a few minutes ago.

14              Fair?

15        A     Where the commit is uploaded, reviewed by

16    peers, and then merged, yes, that's accurate.

17        Q     Okay.  By the way, are you familiar with

18    PixelExperience?

19              MR. YANG:  Object as beyond the scope.  Object

20    to form.

21              THE WITNESS:  The first encounter of the term

22    was moments ago at the top of a document you provided.

23    BY MR. MIRZAIE:

24        Q     Got it.  Okay.

25              Back to Exhibit 43.  So this was added it looks
```

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```
 1    like June 12th, 2011, by you; correct?

 2         A     June 12th, 2011, yes.

 3         Q     Yeah.  And your summary of it is, "External

 4    mutation of full NetworkPolicy set."

 5              That's the first sentence in your

 6    summary; correct?

 7         A     Yes.

 8         Q     Then what you say in the next paragraph is,

 9    "Instead of embedding complex template coexistence rules

10    into policy service, rely on external editors to enforce

11    and offer atomic get/set operations for full policy

12    sets."

13              Do you see that?

14         A     I do.

15         Q     Right below it you say, "Generate default

16    mobile policy when none exists."

17              Do you see that?

18         A     I do.

19         Q     What are you referring to by the "default

20    mobile policy"?  Are you referring to the network policy

21    that you're adding to here?

22              MR. YANG:  Object to form.

23              THE WITNESS:  The role of Network Policy

24    Manager was both to enforce rules on applications but

25    also to make users aware of their total overall data
```

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```
 1    usage on the device.

 2            And in this case, the default mobile policy

 3    refers to the latter, of the overall total usage of the

 4    user's mobile data plan.

 5    BY MR. MIRZAIE:

 6        Q    Okay.  And then so as of this date, June 12th,

 7    2011, that didn't exist in Android phones; fair?

 8        A    That's correct.

 9        Q    And right above it, it says -- in the sentence

10    that we read that begins with "instead of"; do you see

11    that?

12        A    Yes.

13        Q    And what are you referring to by "embedding

14    complex template coexistence rules into policy service"?

15        A    May I take a moment to review the larger

16    commit?

17        Q    Sure.

18        A    Thank you.

19            MR. YANG:  Just to be clear, just review what's

20    in the exhibit.

21            THE WITNESS:  Oh, okay.

22            Okay.  I'm ready for your question.

23    BY MR. MIRZAIE:

24        Q    So -- well, let me ask a specific question.

25            What did you mean by "rely on external editors
```

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1   to enforce"?

2   A   In this case, the external editor would be the

3   settings application on the device.

4   Q   Okay. And so you will rely on that external

5   editor to enforce?

6   MR. YANG: Object to form.

7   THE WITNESS: We're relying on them to avoid

8   creating conflicting policies or network rules. So an

9   example, I could create two policies, one that says my

10   T-Mobile data cap is two gigabytes, and I could create a

11   second policy which says my limit is four gigabytes.

12   So that's an example of, like, rules that

13   should not be allowed to co-exist. The user as part of

14   their billing relationship with T-Mobile should only have

15   one limit. So the summary of this sentence is saying we

16   in the core operating system are not attempting to do --

17   to disambiguate those, and we're relying on the settings

18   application when they configure those to resolve any

19   conflicts, to avoid duplicate rules.

20   BY MR. MIRZAIE:

21   Q   Got it. And just a couple more questions, and

22   we could take a break.

23   If you could go back to Exhibit 12 that my

24   colleague, Mr. Schmidt, I think, showed you, or in any

25   event, it's in the ShareDrive.

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```
 1        A     Could you refresh me the title of that or the

 2     title --

 3        Q     Yeah, I think it says

 4     12_Android_V2.2_R1_ConnectivityManager?

 5        A     Yes, I have that -- I have that up.

 6        Q     Okay.  And I think we confirmed that 2.2 was

 7     not finalized until, I believe, June or July 2011 --

 8     sorry, strike that.

 9              I think we confirmed earlier today that 2.2 was

10     not finalized until June 2010.

11              Do you recall that?

12              MR. YANG:  Object to form.

13              THE WITNESS:  If I'm allowed to click on the

14     rough tags for this release, I can answer that question.

15     BY MR. MIRZAIE:

16        Q     Sure.

17        A     So the rough tag for 2.2_r1 was created on

18     Tuesday, June 29th, 2010.

19        Q     Got it.

20              So if we go back, do you see where it has a

21     copyright date of 2008, right below the blob number?

22        A     Yes, I see that.

23        Q     So that doesn't mean that all of Android 2.2

24     was created as of 2008; correct?

25              MR. YANG:  Object to form.  Object as beyond
```

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 1   the scope.

 2   THE WITNESS: The copyright notice we attach to

 3   a file when it's first created. And the copyright year

 4   is not modified if the file is modified in the future.

 5   BY MR. MIRZAIE:

 6   Q   Got it.

 7   And obviously 2.2 was modified after the file

 8   was first created, obviously; correct?

 9   A   Yes.

10   Q   And so was ConnectivityManager; fair?

11   A   ConnectivityManager is the file we're looking

12   at here.

13   Q   Right. Okay. So yeah, ConnectivityManager,

14   the file we're looking at here, was modified after the

15   copyright of 2008; right?

16   A   Yes.

17   Q   In fact, it was modified even after Android 2.2

18   was finalized; correct?

19   A   Most assuredly, yes.

20   Q   So if we go down to -- I think there's a few

21   places where this shows up, but if you go to Line 107

22   through 113, for example. Actually, it's 106

23   through 113.

24   You see how there's a slash, star, star at 106

25   and at 113 there's a star and then slash?

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1   A   Yes.

2   Q   What goes in between that is what's known as a

3   comment in the code; correct?

4   A   The double star at the beginning is an

5   indicator that this is intended to be publicly visible

6   public developer documentation.

7   (Reporter clarification.)

8   THE WITNESS: Publicly -- it is part of the

9   public developer documentation.

10   BY MR. MIRZAIE:

11   Q   And where it says, on Line 110 through 112, "If

12   an application uses the network in the background, it

13   should listen for this broadcast and stop using the

14   background data if the value is false."

15   Do you see that?

16   A   I do.

17   Q   And by "application," you're referring to the

18   third-party applications like the ones that were -- the

19   developers of which were your audience for your IO

20   presentation; correct?

21   A   Yes.

22   MR. YANG: Object to form.

23   THE WITNESS: Yes.

24   BY MR. MIRZAIE:

25   Q   And where it says it should listen for this

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1   broadcast and stop using background data if the value is

2   false, do you see that?

3   A   I do.

4   Q   That's in the comment; right? You see that?

5   A   Yes, I do.

6   Q   Without the developer writing some additional

7   code, there's nothing to enforce or force the -- some

8   stoppage of using background data -- strike that.

9   That part is -- of the comment, there's no

10   enforcement of that in the actual code itself; correct?

11   It's what you call a recommendation, using your term

12   earlier; correct?

13   MR. YANG: Object to form.

14   BY MR. MIRZAIE:

15   Q   Strike that. I'll ask a simpler question.

16   MR. MIRZAIE: Sorry, Desiree.

17   BY MR. MIRZAIE:

18   Q   This is a recommendation, to use your language

19   from earlier today; correct?

20   A   Yes. We're recommending developers perform

21   this action.

22   Q   And I think you even use the phrase "best

23   practices" to refer to this.

24   Am I correct?

25   A   That's accurate, yes.

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1   Q   Network Policy Manager, we referenced actual

2   code that would -- strike that.

3   In Network Policy Manager, we referenced actual

4   code earlier today that would enforce a

5   POLICY_REJECT_BACKGROUND.

6   Do you see that -- or do you remember that?

7   A   I do recall that, yes.

8   Q   According to your summary we discussed a few

9   moments ago, that will "reject network traffic from

10   background processes."

11   Do you recall that discussion?

12   MR. YANG: Object to form.

13   THE WITNESS: I actually don't recall us

14   getting that far. Maybe we did.

15   BY MR. MIRZAIE:

16   Q   We did. At any rate, looking --

17   MR. YANG: Whenever you're ready for a break --

18   I know you said a couple minutes. That was a couple

19   minutes ago.

20   MR. MIRZAIE: Yeah. It will just be another

21   minute or so.

22   BY MR. MIRZAIE:

23   Q   Back to Exhibit 12, where it says it should

24   listen for this broadcast and stop using background data

25   if the value is false, in Lines 110 through 112, do you

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```
 1     see that?

 2         A     I do, yes.

 3         Q     Again, that was the recommendation from Android

 4     or Google.

 5               There is a code that actually enforces that in

 6     the OS to block access request without any cooperation

 7     from third-party developers; fair?

 8               MR. YANG:  Object to form.

 9               THE WITNESS:  Could you clarify which version

10     of the operating system you're asking about?

11     BY MR. MIRZAIE:

12         Q     1.6.

13         A     Then that's a correct statement as Android 1.6.

14         Q     Okay.  Before Ice Cream Sandwich, if I change

15     my -- strike that.

16               If I change my question to the code before Ice

17     Cream Sandwich, your answer would still be that that's

18     correct; correct?

19         A     Yes, that would be accurate.

20               MR. MIRZAIE:  Okay.  We can take a break.

21               THE VIDEOGRAPHER:  We're going off the record.

22               This is the end of Media Unit 5.  The time is

23     2:18 p.m.

24               (Break held off the record.)

25               THE VIDEOGRAPHER:  We are back on the record.
```

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 1   This is the beginning of Media Unit 6. The time is

 2   2:29 p.m.

 3   MR. MIRZAIE: All right. So if you can go back

 4   to your ShareDrive, Mr. Sharkey. I added a few more

 5   documents beginning with Exhibit 44.

 6   (Exhibit 44 marked.)

 7   THE WITNESS: Okay. I have that file open.

 8   BY MR. MIRZAIE:

 9   Q   Okay. And do you recognize this document?

10   A   I recognize the source code that it refers to,

11   yes.

12   Q   And what's the source code that it refers to?

13   A   NetworkPolicyManagerService.java.

14   Q   Got it.

15   And this is a 100-page document. Can you

16   describe what this document is and how it might differ

17   from a diff or a commit?

18   MR. YANG: Object to form.

19   THE WITNESS: This view is a complete and

20   accurate picture and snapshot at a moment in time of the

21   complete contents of the file.

22   BY MR. MIRZAIE:

23   Q   Okay. And do you see on Lines 57 -- well,

24   let's start there.

25   Line 57 it says import static

                                                    Page 173

1   android.net.ConnectivityManager.FIREWALL_CHAIN_DOZABLE?

2   A   Yes, I see that line.

3   Q   Does that relate to the doze mode feature?

4   A   That would -- that would be my assumption. I'm

5   not aware of that constant on its own.

6   Q   And when -- strike that.

7   With the word "import static" or the phrase at

8   the beginning of that line, what does that mean in the

9   context of this document or the code in general?

10   A   It allows the remainder of the file to

11   reference that exact item by a type of shorthand

12   notation.

13   Q   What are some examples of shorthand notations?

14   MR. YANG: Object to form.

15   THE WITNESS: So later in the file, I -- you

16   may have to type out the full name,

17   ConnectivityManager.FIREWALL_CHAIN_DOZABLE, and so by

18   import staticing it, you can use a shorter reference and

19   just reference the term "FIREWALL_CHAIN_DOZABLE."

20   BY MR. MIRZAIE:

21   Q   Got it.

22   Right below -- strike that.

23   On Line 50, there's a similar phrase, but it

24   begins -- strike that.

25   There's a similar phrase, but it ends with

Page 174

1   BLOCKED_REASON_APP_STANDBY.

2   Do you see that?

3   A   I do.

4   Q   And am I correct that that's referring to the

5   app standby feature, or it relates to the app standby

6   feature?

7   MR. YANG: Object to form.

8   THE WITNESS: That would be my best guess, but

9   I don't know. I haven't looked at the direct underlying

10   source code to confirm that.

11   BY MR. MIRZAIE:

12   Q   But you are familiar with the app standby

13   feature; correct?

14   A   Yes.

15   Q   And with that feature, as I understand it, it

16   does inform the app -- strike that.

17   It says block there.

18   Do you see that?

19   A   I do.

20   Q   And that's a reference to blocking internet

21   access requests; fair?

22   MR. YANG: Object to form.

23   THE WITNESS: May I go look at the

24   documentation on those items to confirm my understanding?

25   ///

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1   BY MR. MIRZAIE:

2   Q   Okay.

3   MR. YANG: Hold on a second.

4   Do you have the documentation or the code you

5   want him to look at, Counsel?

6   MR. MIRZAIE: Are you asking me or the witness?

7   MR. YANG: You. I think he's asking you to

8   see -- can he go look at the documentation, in other

9   words.

10   MR. MIRZAIE: I don't think he's asking that.

11   I think he has his own documents.

12   BY MR. MIRZAIE:

13   Q   Do you have the documentation, Mr. Sharkey?

14   A   I could go look it up on the public source code

15   that's available.

16   Q   We can come back and do that later, but I can

17   move on.

18   A   Okay.

19   Q   You do -- strike that.

20   Let me see. Can you describe the app standby

21   feature?

22   MR. YANG: Object to form.

23   THE WITNESS: My understanding of the app

24   standby feature is that the operating system collects

25   usage statistics about an application, and if it notices

Page 176

1   that the user has not interacted with it frequently, it

2   begins to limit its ability -- that application's ability

3   to run on the device.

4   BY MR. MIRZAIE:

5   Q   How does it begin to limit that application's

6   ability to run on the device?

7   A   I would have to look at the source code to

8   answer that accurately.

9   Q   Okay. You are aware that one way it can limit

10 the application's ability to run on the device is by

11 blocking access requests to use internet access.

12   Fair?

13   A   Yes.

14   Q   And that's also true of doze mode, I believe,

15 is that fair, that that's one functionality of doze mode?

16   A   I'm not directly aware of it, but if I looked

17 at the source code, I could give you a specific answer.

18   Q   And we talked about, I think, a battery saver

19 earlier this morning.

20   Do you remember that?

21   A   I think you made reference to it. And that

22 term, I believe my response was that I hadn't encountered

23 that term in the operating system, to my recollection.

24   Q   Let's see here.

25   Data saver, you are familiar with,

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1   though; correct?

2   A   Yes.

3   Q   And one functionality of data saver is that it

4   can also block access requests made by apps to access the

5   internet; correct?

6   A   Under certain conditions, yes.

7   Q   Now, you, I believe, have used in the different

8   documents we see, the word "kill, kill an application."

9   Does that ring a bell?

10   A   It's a term broadly we use across the operating

11   system, yes.

12   Q   What's the difference between blocking an

13   access request to internet access and killing an

14   application altogether, just so I know?

15   MR. YANG: Sorry, I didn't mean to interrupt.

16   Object to form. Object as beyond the scope.

17   THE WITNESS: For Android, killing an

18   application terminates its process, and it can no longer

19   execute any functionality.

20   In contrast, when we block a network, when

21   the -- when that application asks, like, which network is

22   active and is it connected, we -- we may change our

23   answer just for them to say no, it's not connected right

24   now.

25   ///

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```
 1    BY MR. MIRZAIE:

 2        Q     Got it.

 3              Okay.  In data saver, under certain conditions,

 4    to quote your prior testimony, the system can block

 5    access requests made by an app.

 6              Can you explain that a little further?  How

 7    does it do that?

 8        A     It does it to -- broadly, I would say there's

 9    two mechanisms or two ways that that is -- interacts with

10    applications.  One is when that application that's

11    blocked asks for the current network status, the system

12    will adjust the answer to tell them the network is

13    disconnected.

14              A second way, even if an application chooses to

15    ignore that answer and still attempts to use the

16    internet, we use iptables rules at the Linux kernel level

17    to block any attempts to use the network.

18        Q     And those two functionalities of the OS, that

19    was not available prior to -- well, I'll make it easy --

20    prior to Ice Cream Sandwich.

21              Fair?

22        A     That's accurate, yes.

23        Q     How does, under certain conditions, doze mode

24    block access requests made by apps?

25        A     My understanding of the doze feature is when a
```

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1   device is sitting idle and the user is not interacting

2   with it, we block many of the applications on the device

3   for a period of time.

4   Q   And so that can include blocking access

5   requests to use the internet; correct, if you recall

6   sitting here today?

7   A   Right. So request attempts, for example, by

8   opening a socket or transmitting data, yes, it blocks it.

9   Q   And that functionality that you just described

10   a moment ago, that was not available, certainly not

11   before Cupcake -- strike that. I'm sorry.

12   That functionality that you just described in

13   your last answer, that was not available certainly before

14   Ice Cream Sandwich; correct?

15   MR. YANG: Object to form. Object as beyond

16   the scope.

17   THE WITNESS: The combination of blocking

18   traffic based on those -- based on conditions of the

19   device did not exist before Ice Cream Sandwich.

20   BY MR. MIRZAIE:

21   Q   Now, when you kill an app -- and I think

22   there's some documents on this from you. But we could

23   just probably short-circuit it.

24   When you kill an app and you have to restart

25   it, that process takes up some battery; correct?

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```
 1        A     Yes, that's accurate.

 2        Q     What are the other downsides from a user's

 3   perspective to killing an app and having to restart it?

 4              MR. YANG:  Object to form.  Object as beyond

 5   the scope.

 6              THE WITNESS:  The way it would be visible to

 7   the user in a negative way is when they go to launch an

 8   app from their home screen, it may -- it may appear

 9   longer to start.

10   BY MR. MIRZAIE:

11        Q     Okay.  Any other downsides that you can think

12   of --

13              MR. YANG:  Same objections.

14   BY MR. MIRZAIE:

15        Q     -- just sitting here today?

16        A     Obscure areas of the Linux kernel were forced

17   to reload data -- like repage data again from disc.

18        Q     And does that take up CPU cycles and/or

19   battery?

20        A     Yes, it does.

21        Q     What are the benefits of doze mode?

22        A     I would say the primary benefit of doze mode to

23   users is that at the end of the day, their battery lasts

24   longer.

25        Q     And what about data saver?
```

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1   A   Data saver, I would say the benefits are

2   twofold: One, it helps expand -- extend the user's

3   battery life, but it can also reduce the bill with their

4   mobile carrier.

5   Q   Okay. And what about app standby?

6   A   I would say the primary benefit of app standby

7   is extending the user's battery life.

8   Q   Back to -- strike that.

9   You discussed the get background data setting

10   earlier today a few times.

11   Do you recall that?

12   A   I do, yes.

13   Q   And that was something that was in parts of

14   Android prior to Ice Cream Sandwich; right?

15   A   Yes, we saw references in the Cupcake code.

16   Q   And none of the references that you saw today

17   refer to the get background data setting as a,

18   quote/unquote, policy; fair?

19   You didn't see that word; right?

20   MR. YANG: Object to form.

21   THE WITNESS: No, I have not seen it described

22   as a policy today.

23   MR. MIRZAIE: So if we -- back to your

24   ShareDrive, let's go to -- just flipping through these

25   docs. I think the last doc we saw was 44, and then if

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1   you could open 45 now.

2   (Exhibit 45 marked.)

3   THE WITNESS: Which one would you like me to

4   open?

5   BY MR. MIRZAIE:

6   Q   Yeah, it's 45, so it's Exhibit EX.45, and then

7   it is services_java and then a bunch of other stuff.

8   A   NetworkPolicyManagerService.java as of a

9   particular commit.

10   Q   Right. This is a 34-page document, just to

11   make sure we're talking about the same thing.

12   A   Yes.

13   Q   And what is this, and how does it differ from

14   Exhibit 44, just generally, if you know?

15   MR. YANG: Object to form.

16   THE WITNESS: As best as I can tell, Exhibit 44

17   appears to be a more recent version of that same file.

18   MR. MIRZAIE: Got it.

19   All right. So I also uploaded Exhibit 46, if

20   you could pull that up.

21   (Exhibit 46 marked.)

22   BY MR. MIRZAIE:

23   Q   And I believe this is the complete version of a

24   diff or commit that we discussed earlier today that was

25   authored by you on May 17th, 2011. And the summary

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```
1    begins with -- we talked about this before the break --

2    "APIs to Profile Network Usage for Current UID."

3              Do you see that?

4         A    I do, yes.

5         Q    And this is -- I think the last document we

6    looked at was a one-page document.  This is a nine-page

7    document; right?

8         A    Yes, it is.

9         Q    Okay.  So this is a more complete version of

10   the other document; fair?

11        A    Yes, that's accurate.

12             MR. MIRZAIE:  Okay.  Go to 47 -- Exhibit 47

13   now.

14             (Exhibit 47 marked.)

15             THE WITNESS:  Okay.

16   BY MR. MIRZAIE:

17        Q    So this is a diff or commit -- first of all,

18   strike that.

19             Is this a diff or a commit?

20        A    This is a commit.  And as we mentioned earlier,

21   commits are closely related to diffs.  It is a commit.

22        Q    Okay.  So looking at it a bit more closely,

23   this was added by you on June 29th and committed on

24   June 30th; correct?

25        A    Yes.
```

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1   Q   And the summary here says, "Enforce Background

2   Data Flag, Rules Through Netd."

3   Do you see that?

4   A   I do, yes.

5   Q   Can you describe that process that you're

6   summarizing there?

7   A   May I have a few moments to review the

8   document?

9   Q   Certainly.

10   A   Thank you.

11   Okay. I'm ready for your question.

12   Q   I think my question was: Can you describe what

13   you meant when you added the first sentence in your

14   summary here of, quote, "Enforce background data flag,

15   rules through netd"?

16   A   The first line of the commit message is

17   intended to stand alone, and so it's summarizing two

18   different things in the single line of text.

19   The first item, "enforce background data flag,"

20   my reading -- my interpretation of the commit, the source

21   code, is reading the user preference from the settings

22   app that we had discussed earlier today, and when it has

23   been configured, it pushes down enforcement rules to

24   the -- to netd to block background traffic.

25   Q   Got it.

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1   And when you say "block background traffic,"

2   what do you mean?

3   A   In this case, it looks like it's blocking

4   network traffic on metered interfaces or ones that we

5   know are expensive for the user.

6   Q   Okay. And -- so a few moments ago you said

7   that your interpretation of the commit source code is

8   that reading the user preference from the setting app

9   that we had discussed earlier today, and when it has been

10   configured, it pushes down enforcement rules to netd to

11   block background traffic; right?

12   A   Yes.

13   Q   And before June 20 -- 11th, there were no such

14   enforcement rules, to use your language; correct?

15   MR. YANG: Object to form. Object as beyond

16   the scope.

17   Just to confirm, you said before June 11th?

18   MR. MIRZAIE: June 2011.

19   MR. YANG: Same objections.

20   BY MR. MIRZAIE:

21   Q   I can make it even easier.

22   Before 2011, there were no such enforcement

23   rules; correct?

24   A   That's accurate, yes.

25   MR. YANG: Same objections.

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```
 1     BY MR. MIRZAIE:

 2         Q     And what do you mean by "enforcement rules" --

 3     strike that.

 4             Just to be a little clearer in my question, how

 5     do enforcement rules differ from, to use your language,

 6     recommendations or best practices, as you described

 7     earlier today?

 8         A     Yeah.  Actually, I'll borrow a phrase you've

 9     used a couple of times today, "belts and suspenders."

10     That's the way I would characterize.

11             We still are recommending that apps abide by

12     the best practices, but, for example, sometimes they can

13     have bugs in their application.

14             And so this is almost -- it's a belt and

15     suspenders of, like, in case they ignored it, in case

16     they forgot, like, this helps catch those cases.

17         Q     And the belt and suspenders here, when you say

18     "catch those cases," it would be to actually enforce it

19     through the operating system; correct?

20         A     That's accurate, yes.

21         Q     And you don't need the third-party developers

22     to write additional code like you were suggesting in your

23     IO presentation; correct?

24             MR. YANG:  Object to form.

25             MR. SCHMIDT:  Objection.  Form.
```

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1   THE WITNESS: There would still be some code

2   they would need to write. They would still -- we would

3   still recommend they check the active network connection

4   to see if it's connected. If they did not do that, like,

5   they would end up wasting battery.

6   BY MR. MIRZAIE:

7   Q   But they wouldn't need to write the -- all the

8   same types of code that you were referring to, obviously,

9   two years earlier; right?

10   MR. YANG: Object to form. Objection as beyond

11   the scope.

12   BY MR. MIRZAIE:

13   Q   Strike that. We can move on.

14   Now, in this summary, you also say, "Connect up

15   netd penalty box through NMS."

16   Do you see that?

17   A   I do.

18   Q   And NMS is network -- well, strike that.

19   What is NMS?

20   A   NMS is network management service.

21   Q   Okay. And after that, you say, "Enforce the

22   existing background data flag by putting all UIDs in

23   penalty box."

24   Do you see that?

25   A   I do, yes.

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1   Q   And there wasn't that specific penalty box

2   before 2011; correct?

3   A   That's accurate, yes.

4   Q   And this kind of enforcement wasn't available

5   before 2011.

6   Fair?

7   A   When you say the "kind of enforcement," so what

8   do you mean by the "kind of enforcement"?

9   Q   The kind -- strike that.

10   What are you referring to in this commit?

11   A   So the functionality in netd is new. It did

12   not exist before that time period. But as a reminder,

13   we're building it using existing kernel -- some existing

14   kernel functionality.

15   MR. MIRZAIE: Okay. If we go -- I think this

16   was 47. So 48, I just wanted to go to that one.

17   Exhibit 48.

18   (Exhibit 48 marked.)

19   THE WITNESS: Yes, I have it open.

20   BY MR. MIRZAIE:

21   Q   And this is a commit also by you in -- on

22   May 19th, 2011, authored by you; correct?

23   A   Yes, sir.

24   Q   And it says here, in your summary, "Policy and

25   Rules for ConnectivityManager."

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1   Do you see that?

2   A   "Policy and rules work for

3 ConnectivityManager," yes.

4   Q   Yes. Sorry, I missed the word "work."

5   And then right beneath that you say, "Teach

6 ConnectivityManager about UID-specific rules derived from

7 policy, such as rejecting network traffic on paid

8 services."

9   Do you see that?

10   A   Paid interfaces. Yes, I see that.

11   Q   Sorry. Paid interfaces. What is wrong with me

12 today?

13   Now, when you say, "UID-specific rules derived

14 from policy," you're referring to the network policy

15 service; correct?

16   MR. YANG: Object to form.

17   THE WITNESS: Yes.

18 BY MR. MIRZAIE:

19   Q   And what do you mean by "teach

20 ConnectivityManager" here in that sentence?

21   A   May I look at the larger context of the commit?

22   Q   Yes.

23   A   Thank you. And by "larger context," I mean

24 this exhibit -- the exhibit in front of me.

25   Q   Yeah.

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 1   A   Okay. I'm ready for your question.

 2   Q   Yeah. My question was: What do you mean here

 3   when you stated the -- or summarized this as "teaching

 4   ConnectivityManager about UID-specific rules derived from

 5   policy," and specifically with regard to the phrase

 6   "teach"?

 7   A   Teach -- another way to describe that would be

 8   to extend. So ConnectivityManager knows about various

 9   reasons, and we're teaching it -- we're adding, like, a

10   new reason.

11   Q   And so prior to 2011, ConnectivityManager

12   didn't know about the UID-specific rules derived from the

13   policy.

14   Fair?

15   A   Yes, that's correct.

16   MR. MIRZAIE: We could jump to 49, if you don't

17   mind.

18   (Exhibit 49 marked.)

19   BY MR. MIRZAIE:

20   Q   Do you see that exhibit?

21   A   I do. I have it open.

22   Q   No, actually -- sorry. Let me actually replace

23   that. So I will remove it. Just a quick sidetrack here.

24   There's a new Exhibit 49 in your ShareDrive.

25   If you could open up that one for me, sir, that would be

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```
 1    great.
 2         A    Okay.  I have it open.
 3         Q    Okay.  And this is entitled "Power Management,
 4    Android Developers."
 5              Do you see that?
 6         A    I do, yes.
 7         Q    And it refers to Android 9 (API Level 28)
 8    introducing, quote/unquote, new features to improve
 9    device power management.
10              Do you see that?
11         A    I do, yes.
12         Q    We talked about app standby a little bit
13    earlier today, but right beneath that, there's something
14    called battery saver improvements.
15              Do you see that?
16         A    I do.
17              MR. YANG:  Sorry to interrupt.
18              Just for the record here, this is a document
19    that you downloaded from
20    developer.android.com/about/versions/pie. --
21    /power; correct?
22              MR. MIRZAIE:  Yeah.
23              MR. YANG:  I just want to make sure that the
24    source on the bottom here is the source of the document.
25              MR. MIRZAIE:  Okay.
```

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1   BY MR. MIRZAIE:

2   Q   Do you see the word "battery saver" there?

3   A   I do, yes.

4   Q   Including in the parenthetical where it says

5   "battery saver" and below when it says, "when battery

6   saver is turned on"?

7   A   I do see that, yes.

8   Q   Does that refresh your recollection of what

9   battery saver is?

10   MR. YANG: Object to form. Object as beyond

11   the scope.

12   BY MR. MIRZAIE:

13   Q   There's also additional description on Pages 4

14   and 5, if you want to look at that.

15   MR. YANG: Mr. Sharkey, feel free to look at

16   the entire document for context, if needed.

17   THE WITNESS: I am. Thank you.

18   Yes, this does help recall my memory.

19   BY MR. MIRZAIE:

20   Q   And what is battery saver?

21   MR. YANG: Object to form. Object as beyond

22   the scope.

23   THE WITNESS: My recollection and understanding

24   is it's a mode that a user can put their device into to

25   aggressively save battery usage.

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```
 1    BY MR. MIRZAIE:

 2        Q      And in that mode, would there be a function --

 3    well, strike that.

 4             Is that still available in the current Android?

 5             MR. YANG:  Object to form.  Object as beyond

 6    the scope.

 7             THE WITNESS:  Unfortunately, I don't know.

 8    BY MR. MIRZAIE:

 9        Q      According to your knowledge of what that's

10    referring to, would one way the system would save battery

11    is to block network access requests by apps running in

12    the background?

13             MR. YANG:  Same objection.

14             THE WITNESS:  Based on my reading of Bullet

15    Point Number 4, yes, on Page 5 of this document.

16    BY MR. MIRZAIE:

17        Q      And what's the benefit of that?

18             MR. YANG:  Same objections.

19             THE WITNESS:  The mobile radio on the device is

20    one of the larger consumers of power when it's in use, so

21    blocking network traffic allows that -- the modem to

22    remain at a lower power state.

23    BY MR. MIRZAIE:

24        Q      Okay.  And when was that first added to

25    Android?
```

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1   MR. YANG: Object to form. Object as beyond

2   the scope.

3   THE WITNESS: My reading of this document on

4   Page 1 indicates Android 9 is when these features were

5   introduced.

6   BY MR. MIRZAIE:

7   Q   Okay. Network Policy Manager was added for the

8   first time -- strike that.

9   The first iteration of Network Policy Manager

10   was released in Ice Cream Sandwich; correct?

11   A   Yes, that's correct.

12   Q   And we referred to process states and

13   importance values earlier today.

14   Do you remember that discussion?

15   A   I do.

16   Q   And how did or how does -- strike that.

17   How did the first iteration of Network Policy

18   Manager in Ice Cream Sandwich consume process states for

19   importance values, generally, to the extent you recall?

20   MR. YANG: Sorry, I didn't mean to interrupt.

21   Object to form.

22   THE WITNESS: As I recall, the final -- one of

23   the final designs we landed on was looking at the process

24   state and using a threshold value. If the process state

25   was above or below a particular threshold is how we

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1   determined foreground versus background.

2   BY MR. MIRZAIE:

3   Q   And then what would the system do with that to

4   enforce some type of rule?

5   A   It would take the policy the user had

6   expressed, combine that together with the current system

7   state to derive the simple rules --

8   (Reporter clarification.)

9   THE WITNESS: It would take -- could you repeat

10   the question to --

11   BY MR. MIRZAIE:

12   Q   Yeah.

13   And what would the system do with that to

14   enforce any type of rule?

15   A   Network Policy Manager would take the policy

16   that a user may have set. It would combine that with the

17   current state of applications on the device to derive

18   rules that it would push down towards netd to configure

19   iptables rules into the Linux kernel.

20   MR. MIRZAIE: So if you go back to the

21   ShareDrive -- let's see here. Yeah, I think we are on --

22   well, I'd like to introduce Exhibit 50 now.

23   (Exhibit 50 marked.)

24   MR. YANG: Counsel, did you mean to replace

25   that with the Android Git version, or did you still want

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1   to use the PixelExperience one?

2   I notice you've been switching back to the

3   Google one, so I didn't know if you meant to do that for

4   this one too.

5   MR. MIRZAIE: Yeah. So Exhibit 50 is -- it has

6   the Google source; right?

7   MR. YANG: Not the one I have on the screen

8   here, but maybe -- well, no, that shouldn't be an issue.

9   MR. MIRZAIE: Oh, weird. Sorry about that.

10   MR. YANG: No worries. I figured that was the

11   case.

12   MR. MIRZAIE: Yeah.

13   All right. Let me take a look at this. Let me

14   come back to that. Let me remove this one.

15   MR. YANG: Do you need a break?

16   MR. MIRZAIE: Sure.

17   MR. YANG: No, no. I was just talking to

18   Mr. Sharkey. While you were doing that, I was just

19   checking. He seems okay.

20   BY MR. MIRZAIE:

21   Q   Let's stick with Exhibit 50 the way you see it

22   right now. And I'll just ask a few questions on it, and

23   then we can maybe replace it later.

24   Do you have Exhibit 50 open?

25   MR. SCHMIDT: Hold on. Hold on.

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1   Just so I understand, what do you mean when you

2   say we're going to replace it later?

3   MR. MIRZAIE: Yeah, fair question. I might add

4   another exhibit with a different number and ask him

5   questions about that.

6   MR. SCHMIDT: Okay. Okay. No problem. Okay.

7   That's fine.

8   BY MR. MIRZAIE:

9   Q   So if you look at the Exhibit 50 that is on

10   there right now, sir, there is a statement here in the

11   summary that says, "Push Firewall Rules Up to

12   ConnectivityService."

13   Do you see that?

14   A   I do.

15   Q   And separate and apart from whatever this

16   document says, do you recall during the development of

17   Network Policy Manager when firewall rules were pushed up

18   to ConnectivityService?

19   MR. YANG: Object to form.

20   THE WITNESS: I have -- yes, I have a vague

21   recollection. I probably moved on to other projects but

22   returned to make this contribution.

23   BY MR. MIRZAIE:

24   Q   What did that mean, to "push firewall rules up

25   to ConnectivityService"?

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1   A   May I look at the commit in its entirety to

2   refresh my memory?

3   Q   Sure.

4   A   Which I don't have access to.

5   MR. YANG: So he doesn't have access to the

6   commit.

7   THE WITNESS: To the diff aspect to the code

8   that was changed.

9   MR. MIRZAIE: Okay. It's not -- we could come

10   back to it.

11   THE WITNESS: Okay.

12   MR. MIRZAIE: -- with another document.

13   (Exhibits 51 & 52 marked.)

14   BY MR. MIRZAIE:

15   Q   I have now uploaded two more exhibits, if you

16   could look at those. Now, Exhibit 51 and 52.

17   A   I have 51 loaded.

18   Q   Okay. Great.

19   This is from googlesource.com; correct?

20   A   Yes, it is.

21   Q   The author here is not you actually. It's

22   Dianne Hackborn; right?

23   A   That's correct.

24   Q   And Dianne Hackborn worked with you to develop

25   Network Policy Manager and other files in

Page 199

1   Android; correct?

2   A   Yes, we've collaborated closely.

3   Q   And this is actually a commit that was added in

4   2014; correct?

5   A   Yes, it is.

6   Q   And it says, "Add network access blocking when

7   in battery save mode."

8   Do you see that?

9   A   I do.

10   Q   Is this part of what we were talking about

11   previously with respect to Android Pie and the battery

12   saver feature there?

13   MR. YANG: Object to form.

14   Sorry, I didn't mean to interrupt.

15   MR. MIRZAIE: It's okay.

16   MR. YANG: Object to form. Object as beyond

17   the scope.

18   THE WITNESS: Based -- based on my cursory

19   glance of the title, it appears to be related.

20   BY MR. MIRZAIE:

21   Q   Okay. I think the third paragraph starts with,

22   "This new network blocking needs a new facility to be

23   able to whitelist apps, such as GmsCore."

24   Do you see that?

25   A   I do.

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1   Q   What does it mean to whitelist apps?

2   A   Whitelisting is a general concept used to

3   exempt or exclude something from applying to someone.

4   Q   Okay. In the last paragraph, there's a

5   parenthetical that says, "So that we can still do things

6   like background music playback."

7   Do you see that?

8   A   I do.

9   Q   And then it says, "This will be done in a

10   follow-on CL."

11   Do you see that?

12   A   I do.

13   Q   Is CL change log?

14   A   It's a nomenclature for a change list, which is

15   identical to a commit.

16   Q   Got it.

17   Now, this description of still doing things

18   like background music playback, what's your best

19   understanding of that?

20   MR. YANG: Object to form. Object as beyond

21   the scope.

22   THE WITNESS: May I have a moment to read a

23   little more of the context of the commit message?

24   BY MR. MIRZAIE:

25   Q   Yes.

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```
 1        A      Thank you.

 2               Okay.  I'm ready for your question.

 3        Q      What does it mean to -- strike that.

 4               Let me go back.  I forgot my exact question,

 5    but it was a very good one.

 6               What does it -- what's your best understanding

 7    of what's meant here by "so that we can still do things

 8    like background music playback" in this context?

 9        A      My reading of the commit description from

10    Dianne is that she's extending this feature to block all

11    networks, not just metered ones.  And so a user

12    expectation is that perceptible applications should still

13    be able to use a network and not be unconditionally

14    blocked from all networks.

15        Q      What did you mean by "perceptible

16    applications"?

17        A      So I'm quoting her term from her commit message

18    here.  Perceptible, if I recall correctly, is another one

19    of the constants along that continuum or spectrum of

20    process states.

21        Q      Got it.

22               And is that a term that the engineers would

23    use?

24        A      Correct.

25               MR. YANG:  Hold on.  Sorry.
```

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1   Object to form. Object as beyond the scope.

2   THE WITNESS: Yes, I would say so.

3   BY MR. MIRZAIE:

4   Q   To mean what you just summarized the meaning to

5   be?

6   A   The reason engineers would use that term

7   "perceptible" is because it matches one of the constants

8   defined in the operating system, and so if the -- it

9   would match whatever the documentation is connected to

10   that constant.

11   Q   Got it.

12   Would that be consistent with or referencing

13   perceptibility to the user?

14   MR. YANG: Object to form. Object as beyond

15   the scope.

16   THE WITNESS: I think that would be the goal of

17   naming a constant, is to try to express its meaning is

18   the reason for it being named a certain way.

19   BY MR. MIRZAIE:

20   Q   So the goal would be to reference the ability

21   for a user to perceive it; correct?

22   MR. YANG: Same objections.

23   THE WITNESS: Yes, that would be -- if I was

24   naming something, I would attempt to communicate as best

25   or as concise of a meaning as I could when naming a

                                                    Page 203

1   constant.

2   BY MR. MIRZAIE:

3   Q   Got it.

4   Okay. If we go back to the ShareDrive, there's

5   Exhibit 52. We're getting closer to the end here, but --

6   not of the deposition, but just of the stream of

7   documents.

8   If you could pull that up for me, sir.

9   A   I have it up.

10   Q   This is by a Sudheer Shanka, and it's in

11   2018; correct?

12   A   Yes.

13   Q   And, again, this is a commit; correct?

14   A   Yes, that's correct.

15   Slight -- slight clarification. This appears

16   to be a diff file in a larger commit.

17   Q   Got it. Thanks for that.

18   There's a summary here authored by

19   Sudheer; correct?

20   A   Yes.

21   Q   It says here, "Update UID State For Bucketizing

22   Data in FG Versus BG States."

23   Do you see that?

24   A   I do.

25   Q   Am I correct that "FG" refers to foreground,

Page 204

1   and "BG" refers to background?

2   MR. YANG: Objection to form and beyond the

3   scope.

4   THE WITNESS: I think that's a reasonable

5   interpretation, yes.

6   BY MR. MIRZAIE:

7   Q   And how did you all update the UID state for

8   bucketizing data into those two states?

9   MR. YANG: Same objections.

10   THE WITNESS: To answer that, I feel like I'd

11   have to look at the larger context of what the code

12   change was.

13   BY MR. MIRZAIE:

14   Q   Okay. You mean beyond this document; correct?

15   A   Give me a moment to look at --

16   Q   Okay.

17   A   I'm ready for your question.

18   Q   Yeah. The question was: How did you all

19   update the UID state for bucketizing data into those two

20   states?

21   MR. YANG: Same objections.

22   THE WITNESS: Based on this exhibit in front of

23   me, only -- which only looks at partially -- it only

24   looks at one of the files that this commit changed, it

25   appears that this is a trivial -- this one file that is

Page 205

```
 1     present here in the exhibit is a trivial refactoring,

 2     which has no functional change.

 3     BY MR. MIRZAIE:

 4          Q     Okay.  Are you familiar at any level with the

 5     bucketizing, in general, that's referred to here?

 6               MR. YANG:  Object to form.  Objection.  Beyond

 7     the scope.

 8               THE WITNESS:  I could make an educated guess.

 9     BY MR. MIRZAIE:

10          Q     Okay.

11          A     But it would be better if you could point me at

12     some exact code that describes where the bucketizing is.

13          Q     Let's go with your educated guess first, if

14     that's okay.

15          A     So remind me of the question.

16          Q     Yeah.

17               Can you describe the bucketizing process that's

18     referenced here generally, beyond this -- what you call

19     trivial aspect in the document?

20               MR. YANG:  Object to form.  Object as beyond

21     the scope.

22               THE WITNESS:  Unfortunate -- give me a moment.

23     My laptop has signed me out of my corporate account.

24     BY MR. MIRZAIE:

25          Q     No worries.
```

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1   A   So I've lost exit to the -- access to the

2   exhibit. Please give me a moment.

3   Q   Yeah.

4   A   Can you remind me -- Exhibit 52?

5   Q   Yes.

6   A   My best educated guess on the bucketizing data

7   is Network Stats service records the network usage of

8   applications over time. And we categorize that based on

9   if the usage occurred while the app was in the foreground

10   versus the background.

11   Q   Okay. Thank you.

12   MR. MIRZAIE: It might be a good time for a

13   break.

14   Does that work for everybody?

15   THE WITNESS: Sure.

16   MR. MIRZAIE: All right.

17   THE VIDEOGRAPHER: Thank you. We're going off

18   the record.

19   This is the end of Media Unit 6. The time is

20   3:23 p.m.

21   (Break held off the record.)

22   THE VIDEOGRAPHER: We're going back on the

23   record.

24   This is the beginning of Media Unit 7. The

25   time is 3:42 p.m.

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```
 1      BY MR. MIRZAIE:

 2          Q     Mr. Sharkey, I just wanted to ask you some

 3      additional questions, excuse me, on Network Policy

 4      Manager and related items.

 5                Is that okay?

 6          A     Yes, sir.

 7          Q     Starting with the related items, namely, some

 8      of the features we discussed earlier today like doze

 9      mode.  I think we talked about the fact that with doze

10      mode, one of the functions is to block network access

11      requests by an app under certain conditions.

12                Do you recall that?

13                MR. YANG:  Object to form.

14                THE WITNESS:  Yes.  Yeah.

15      BY MR. MIRZAIE:

16          Q     And there's code in the Android operating

17      system that enforces that; correct?

18                MR. YANG:  Object to form.

19                THE WITNESS:  Yes.

20      BY MR. MIRZAIE:

21          Q     And when that functionality is enforced, how is

22      the firewall used, if at all?

23          A     To clarify, firewall has a generic meaning, but

24      there's also a very specific meaning in the netd source

25      code.
```

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1   Can you confirm in which way you're using the

2   term?

3   Q   Can we talk about both, if that's okay?

4   A   I'll try my best.

5   Q   Okay. Let's talk about the more generic way,

6   if that's okay.

7   A   Sure.

8   Q   So how was the firewall used, according to the

9   broader sense of how firewall is used in the industry, if

10   at all, during the doze mode's enforcement of blocking

11   network access requests from apps under certain

12   conditions?

13   MR. YANG: Object to form.

14   THE WITNESS: In the netd source code of the

15   Android platform, it inserts iptables firewall rules into

16   the Linux kernel. Those firewall rules have a

17   precondition that says if a network packet looks like or

18   matches certain criteria, then it takes a follow-up

19   action, for example, dropping the packet to prevent it

20   from going through.

21   BY MR. MIRZAIE:

22   Q   And that functionality of dropping a packet --

23   we'll make this easy -- that wasn't available in the OS

24   prior to Ice Cream Sandwich; correct?

25   A   The iptables functionality to drop packets was

Page 209

1   first used in Ice Cream Sandwich.

2   Q   Now, if we change topics and talk about the app

3   standby feature -- under certain conditions that can also

4   block internet access requests by applications.

5   Do you recall that?

6   A   Yes.

7   Q   And when it does that, how, if at all, is the

8   firewall used -- or a firewall used?

9   MR. YANG: Object to form.

10   THE WITNESS: Similar to my previous answer, we

11   can push down to netd those firewall rules, the iptables,

12   to indicate if there's network traffic from, in this

13   case, an application subject to that behavior.

14   Like, we would -- we're asking the kernel to

15   drop those packets, to not allow -- not allow them

16   through.

17   BY MR. MIRZAIE:

18   Q   Okay. And the operating system would have code

19   that's executed to actually enforce what you just

20   described; correct?

21   A   The Android operating system would push down

22   those iptables rules. The actual -- the actual

23   enforcement of those rules or interpretation of the rules

24   is done inside of the Linux kernel.

25   Q   Okay. And that specific enforcement -- strike

Page 210

 1   that.

 2   That enforcement did not exist before Ice Cream

 3   Sandwich; fair?

 4   MR. YANG: Object to form. Object as beyond

 5   the scope.

 6   THE WITNESS: From what I recall, like, the

 7   iptables functionality to drop packets did exist in the

 8   Linux kernel -- has existed in the Linux kernel for a

 9   long time predating Cupcake.

10   BY MR. MIRZAIE:

11   Q   But the specific functionality to block

12   internet access requests by apps as it's used in app

13   standby, that didn't exist before Ice Cream

14   Sandwich; correct?

15   MR. YANG: Same objections.

16   THE WITNESS: Correct. The pieces of the

17   Android operating system that would support that did not

18   exist before Ice Cream Sandwich.

19   BY MR. MIRZAIE:

20   Q   And with -- data saver also has code in the

21   operating system to enforce a blocking of internet access

22   requests made by apps under certain conditions; correct?

23   A   Yes.

24   Q   And that didn't exist before Ice Cream

25   Sandwich, just to make it easy -- that didn't exist

Page 211

1   before Ice Cream Sandwich; correct?

2   MR. YANG: Same objections.

3   THE WITNESS: The underlying functionality did

4   not exist before Ice Cream Sandwich in the Android OS.

5   BY MR. MIRZAIE:

6   Q   And we referred to a battery saver feature

7   earlier today. And under certain conditions, that also

8   provides code in the OS to block access requests by apps

9   under certain conditions; correct?

10   A   That is my recollection, yes.

11   Q   And that process was not available before

12   Ice Cream Sandwich either; correct?

13   MR. YANG: Same objections.

14   THE WITNESS: Any usage of, like, network

15   blocking based on status did not exist before Ice Cream

16   Sandwich, based on application status.

17   BY MR. MIRZAIE:

18   Q   Okay. So Network Policy Manager -- again, just

19   to reorient ourselves -- that was -- strike that.

20   The work on Network Policy Manager began in

21   2011; right?

22   A   I believe that is the year based on the commits

23   we looked at today.

24   Q   And that was code that ultimately was added to

25   the operating system to actually enforce a network

Page 212

1   policy; correct?

2   MR. YANG: Object to form. Object as beyond

3   the scope.

4   THE WITNESS: Yes.

5   BY MR. MIRZAIE:

6   Q   And one of the features there that we discussed

7   earlier today is to block access requests to use internet

8   services by applications running in the background if

9   certain conditions were met; right?

10   A   Yes.

11   Q   And we talked earlier today that it's the

12   app -- like, the third-party Android developer app that

13   is the one that makes the access request under normal

14   operation; right?

15   A   In the majority of cases, yes.

16   Q   And with the network -- strike that.

17   And with the Network Policy Manager, that had

18   the ability in the operating system to actually allow --

19   strike that.

20   And the Network Policy Manager that we

21   discussed today, that had the ability to block and

22   otherwise control the application's access for internet

23   services; correct?

24   A   On certain networks, yes.

25   Q   And how was the API involved in that general

Page 213

1   process?

2   A   Could you clarify when you say "API"? Is that

3   an API that a third-party developer would interact with

4   or call?

5   Q   As opposed to what other kind of API?

6   A   The underwriting platform has APIs that are

7   intended for internal use. For example, an API that may

8   only be available to the settings application.

9   Q   And which API was used in that process where

10   the Network Policy Manager or doze mode or the other

11   current features would be able to control access to

12   internet services?

13   MR. YANG: Object to form. Object as beyond

14   the scope.

15   THE WITNESS: Generally, any APIs that mutate

16   the state of a policy would be protected with a

17   permission so that only built-in system components or the

18   settings app could configure them.

19   In contrast, there would be -- there may in

20   some cases be APIs where a third-party app can read or

21   observe the state with no additional permissions

22   required.

23   BY MR. MIRZAIE:

24   Q   And so which API would be used in the general

25   process where Network Policy Manager or some of the later

Page 214

1   features that depend on it would be able to control an

2   application's access to the internet?

3   MR. YANG: Object to form. Object as beyond

4   the scope.

5   THE WITNESS: So it sounds like you're

6   describing where there would be -- the user would mutate

7   the state and express a desire to restrict.

8   And in those cases, those APIs would typically

9   be protected and restricted so that only built-in

10   components of the system could mutate that state.

11   BY MR. MIRZAIE:

12   Q   So those are the Android APIs that you referred

13   to earlier; correct? Strike that.

14   I just wanted to go back to the distinction you

15   drew between third-party, you know, interfaces versus the

16   other form of API.

17   What was the verbiage you used so I can just

18   get on the same page as you?

19   A   Yeah, so common terms that we use as engineers

20   are public APIs, which are ones that are published and

21   available for all third-party apps to interact with.

22   And in contrast, there are hidden APIs in the

23   platform. And those are typically not available for

24   third-party apps to call, and they would be blocked or

25   prevented from calling them.

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1   Q   And the hidden API would be used for Network

2   Policy Manager, or the later introduced features that

3   depend on it, to control an app's access to internet

4   services under certain conditions; correct?

5   MR. YANG: Object to form.

6   THE WITNESS: The hidden APIs is where if a

7   user changed something in the settings app, like the --

8   that's where the settings app would push that updated

9   policy into the operating system.

10   BY MR. MIRZAIE:

11   Q   And so that hidden API would be used in the

12   Network Policy Manager process to control an

13   application's access to internet services under some

14   conditions.

15   Fair?

16   A   Broadly, yes.

17   Q   Okay. Now, changing gears and going back to

18   your presentation -- the IO presentation we referred to

19   earlier today. I think that's Exhibit 1.

20   Do you recall that?

21   A   I do.

22   Q   If you could pull it up, maybe we could use

23   that as a reference.

24   A   I have the slide deck in front of me.

25   Q   Great. Let's go to 116.

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1   Now, here, at the -- let me know when you're

2   there.

3   A   I'm at 116.

4   Q   Great. At the bottom portion of the slide -- I

5   think you referred to this earlier today and maybe during

6   the actual video when you gave the presentation as sample

7   code that you guys had come up with for third-party app

8   developers to add.

9   Is that fair?

10   A   That's accurate, yes.

11   Q   And this is referring to listening to the

12   connectivity receiver for a connectivity change; correct?

13   A   Just to correct it slightly, it would be

14   listening for the connectivity change broadcast, and it

15   would be processed by a local component inside of the app

16   called connectivity receiver.

17   Q   Got it. Thanks for that clarification.

18   You're suggesting this to third-party app

19   developers because there was no way inside the operating

20   system itself at the time to enforce the same exact

21   behavior.

22   Fair?

23   MR. YANG: Objection. Form. Same objection.

24   THE WITNESS: I would agree with that

25   statement.

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```
 1    BY MR. MIRZAIE:

 2         Q     Now, if we flip to 117, this slide also

 3    includes some code that you all were suggesting to

 4    third-party app developers; correct?

 5         A     Yes.

 6         Q     And this refers to connectivity receiver and

 7    package manager; correct?

 8         A     Yes.

 9         Q     And, again, the same question:  You're

10    suggesting this to third-party app developers so they can

11    add it because at that time, there was no way for the

12    operating system itself to enforce the same exact

13    behavior?

14              MR. YANG:  Object to form.  Same objection.

15              MR. MIRZAIE:  Strike that.  I'll change the

16    question, then.

17    BY MR. MIRZAIE:

18         Q     This code that you're suggesting -- strike

19    that.

20              You're suggesting this code for third-party app

21    developers to add to their app; correct?

22         A     Yes.

23         Q     So I take it that in the operating system

24    itself, there wasn't a way to -- strike that.

25              Without the app developer adding that code,
```

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```
 1    there wasn't something already inherent in the operating

 2    system itself, obviously, to enforce the same exact

 3    behavior described here.

 4              Fair?

 5       A    There may be a misinterpretation of what this

 6    code is attempting to do.

 7       Q    Maybe -- strike that.

 8              We could go to the next slide there, 118 -- or

 9    actually, let's go to -- by the way, was -- on 117, is

10    that sample code, code that you were recommending for app

11    developers to add to their apps?  Yes or no?

12       A    Yes.

13       Q    If we go to 118, was that code there on

14    Slide 118 code that you were suggesting or recommending

15    that app developers add to their app?

16       A    In some cases, yes.

17       Q    And if we -- if we go to 120, here there's no

18    sample code, but the last bullet point on the slide says,

19    "Consider giving users options for battery usage like

20    update intervals and check the no background data flag."

21              Do you see that?

22       A    I do.

23       Q    And that's a, to use your language from earlier

24    today, a recommendation to the app developers at this

25    time; correct?
```

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1   A   Yes.

2   Q   And based on your earlier testimony that

3   Network Policy Manager was developed for the first time

4   in 2011, that was not developed yet as of the date of

5   this presentation; correct?

6   A   That's accurate, yes.

7   Q   And Network Policy Manager, we just confirmed

8   this a few minutes ago, had the actual code in the OS to

9   actually enforce the network policies, including blocking

10   access requests by background apps under certain

11   conditions.

12   Do you recall that?

13   A   I do recall that, yes.

14   Q   And at no time during this presentation,

15   obviously, did you tell the third-party developers, hey,

16   look, at Google, we're developing Network Policy Manager;

17   fair?

18   MR. YANG: Object to form. Object as beyond

19   the scope.

20   THE WITNESS: We did not tell developers.

21   BY MR. MIRZAIE:

22   Q   Even without referring to Network Policy

23   Manager specifically, you never told the developers when

24   you were giving this presentation that -- or any time in

25   2009, for that matter, that you're developing code to

Page 220

1   actually enforce the network policies within the OS

2   itself as opposed to some of these recommendations for

3   third-party app developers to add code; fair?

4   A   That's an accurate statement, yes.

5   Q   So I think I understand the presentation

6   better.

7   You were -- the recommendation wasn't for

8   Google to actually add code to the operating system to

9   control application requests to use the internet under

10   certain conditions and to enforce a policy whereby those

11   requests can be rejected under certain conditions.

12   You were going into a different direction, to

13   recommend the app developers add code themselves to

14   listen to broadcast intents and things like

15   that; correct?

16   MR. SCHMIDT: Objection. Form.

17   MR. YANG: Same objection.

18   THE WITNESS: I would say that's a reasonably

19   accurate summary.

20   BY MR. MIRZAIE:

21   Q   And Network Policy Manager, that wasn't a small

22   undertaking. That took a large number of hours and lines

23   of code to achieve.

24   Fair?

25   A   Yes. That's accurate.

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1   Q   If you had to grossly estimate how many lines

2   of code, you know, what would you fairly say it involved?

3   A   Several thousand.

4   Q   About how many, I guess, man hours would you

5   say that involved?

6   MR. YANG: Object to form. Object as beyond

7   the scope.

8   THE WITNESS: I would characterize between the

9   total number of people, one person a year.

10   BY MR. MIRZAIE:

11   Q   Would your estimates be similar, kind of in the

12   same ballpark if I were to ask how much -- how many lines

13   of code or time was involved in adding doze mode?

14   MR. YANG: Object to form. Object as beyond

15   the scope.

16   THE WITNESS: We don't know any details of all

17   of the code that was changed to implement those features.

18   Unfortunately, I can't -- I don't think I could offer an

19   accurate estimate.

20   BY MR. MIRZAIE:

21   Q   Would you have the same answer if the question

22   were about battery manager -- excuse me -- battery saver?

23   MR. YANG: Same objections.

24   THE WITNESS: I would have the same answer.

25   Without the familiarity of the code, I couldn't offer an

                                                    Page 222

1   accurate estimate.

2   BY MR. MIRZAIE:

3   Q   Would you have the same answer if the question

4   were about data saver or app standby?

5   A   I would the have the same answer for app

6   standby. I have a better understanding of data saver.

7   Just to clarify, what is -- what is your

8   question, then, related to data saver?

9   Q   How many lines of code did your team have to

10   add to create data saver?

11   MR. YANG: Object to form. Object as to beyond

12   the scope.

13   THE WITNESS: I would broadly -- I would

14   estimate under a thousand for data saver.

15   BY MR. MIRZAIE:

16   Q   And how many man hours was needed for that,

17   roughly?

18   A   As I wasn't directly involved in the writing of

19   the code, I don't think I could offer an accurate

20   estimate.

21   Q   When you and your team decided to go in the

22   Network Policy Manager direction -- strike that.

23   Are you aware of any code pre-Ice Cream

24   Sandwich that would sitting here today -- strike that.

25   Let me start over.

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1   Sitting here today, are you aware of any code

2   pre-Ice Cream Sandwich where the operating system

3   would -- actually, strike that. Never mind.

4   If we could go back to your presentation.

5   A   Which Bates number?

6   Q   Good question. 118.

7   A   Okay.

8   Q   Actually, never mind. Strike that.

9   MR. MIRZAIE: I hate to do this, but can we

10   have like a three-minute break? I don't have much else.

11   I just want to gather my notes so I can make it

12   efficient. It will probably be less than five minutes of

13   questions, if that, but I apologize.

14   THE WITNESS: No problem. It's okay with me.

15   MR. MIRZAIE: Okay. Thank you.

16   THE VIDEOGRAPHER: Thank you. We're off the

17   record.

18   This is the end of Media Unit 7. The time is

19   4:08 p.m.

20   (Break held off the record.)

21   THE VIDEOGRAPHER: We are back on the record.

22   This is the beginning of Media Unit 8. The

23   time is 4:16 p.m.

24   MR. MIRZAIE: Yeah, I actually don't have any

25   further questions at the moment.

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 1   Thanks, Mr. Sharkey. But I'll reserve some

 2   time, if necessary, after my colleague Mr. Schmidt asks

 3   you some additional follow-up questions.

 4   MR. SCHMIDT: Okay. Well, I hate to do this,

 5   but I'm going to need three minutes to consolidate.

 6   We'll be efficient. I don't have much, but I'm going to

 7   need three minutes, if that's okay.

 8   MR. YANG: How much are you estimating?

 9   MR. SCHMIDT: Five minutes at most.

10   MR. YANG: All right. Thanks.

11   MR. SCHMIDT: Okay. Thanks.

12   THE VIDEOGRAPHER: Thanks. We're going off the

13   record.

14   This is the end of Media Unit 8. The time is

15   4:17 p.m.

16   (Break held off the record.)

17   THE VIDEOGRAPHER: We're back on the record.

18   This is the beginning of Media Unit 9. The

19   time is 4:23 p.m.

20   EXAMINATION

21   BY MR. SCHMIDT:

22   Q   Mr. Sharkey, it's Grant Schmidt again. We are

23   almost done. I have just a few quick questions.

24   I'm going to direct your attention to

25   Exhibit 1, which, again, is the deck that captures your

                                                   Page 225

1   2009 presentation.

2   Are you with me?

3   A   Yes.

4   Q   Can you see my screen, which is a reference to

5   the Bates number ending in 118?

6   A   Yes, I can.

7   Q   What does battery state mean in the context of

8   background apps?

9   A   In this slide, we were offering developers the

10   ability to inspect the battery state and suggesting that

11   they may decide to defer work if they noticed the battery

12   was low.

13   Q   What does network state mean in this context?

14   A   I apologize. Did I just use the word "network

15   state," or is that a new term you've just introduced?

16   Q   Oh, sorry. You used -- I'm sorry. We were

17   talking about battery state; right?

18   A   Yes. Did I misspeak by saying network state?

19   Q   No, no. I'm sorry. Let me clarify.

20   I was going to ask you about battery state and

21   network state, and you just defined battery state.

22   A   Yes.

23   Q   And so now I'm curious, can you also define

24   network state in the context of background apps?

25   A   I believe the best definition of network state

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1   would be on one of the nearby slides. This -- the code

2   snippet on this slide does not inspect network state.

3   Q   What would be the -- to the best of your

4   ability, what would be your definition of network state?

5   A   Checking to see the network type, the network

6   subtype, and if it was connected.

7   Q   And you just mentioned that Android was

8   suggesting certain things, for example, the deference of

9   work.

10   Why would Android recommend that apps check

11   items such as battery and network state?

12   MR. MIRZAIE: Objection. Form.

13   THE WITNESS: We recommended it so that the

14   users -- the battery on the user's device would last

15   longer.

16   BY MR. SCHMIDT:

17   Q   There have been a lot of questions,

18   Mr. Sharkey, throughout the afternoon about enforcement

19   versus other items, whether -- the recommendation

20   suggestions, so I want to ask you a little bit about

21   that.

22   Even after Google started enforcing certain

23   items related to background and foreground, is it true

24   that Google still wanted developers to develop their own

25   code?

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```
 1                MR. MIRZAIE:  Objection.  Form.

 2                THE WITNESS:  Yes.

 3      BY MR. SCHMIDT:

 4         Q      And so separate from whether Google was working

 5      on its own to set up enforcement, is it true that the

 6      vision from your perspective is that these developers

 7      continue to use the tools from Android to follow these

 8      best practices that we've discussed today?

 9                MR. MIRZAIE:  Objection.  Form.

10                THE WITNESS:  Yes.  That's accurate.  We would

11      both need to continue working together.

12      BY MR. SCHMIDT:

13         Q      I'm going to ask it one additional way for

14      clarity.

15                While Google was working on the enforcement

16      piece, what was its expectations or desires of the work

17      of the developers in the context of background and

18      foreground apps?

19                MR. MIRZAIE:  Objection.  Form.

20                THE WITNESS:  Our expectation was to continue

21      encouraging to developers to follow these best practices.

22                MR. SCHMIDT:  One second.  Sorry, one second.

23                All right.  We will pass the witness.

24      Mr. Sharkey, thank you, again, for your time all day.

25      ///
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1   EXAMINATION

2   BY MR. MIRZAIE:

3   Q   Mr. Sharkey, you got a lot of questions right

4   now about Google's desires and expectations and

5   recommendations.

6   Do you recall that?

7   A   Yes.

8   Q   I think your video is frozen.

9   Can you repeat your answer?

10   A   My answer was yes.

11   Q   Okay. Network Policy Manager was the first

12   file we viewed today with the word "policy" right in the

13   name; correct?

14   A   Yes.

15   Q   That was actually coded into -- just quoting

16   from your testimony earlier today -- into the operating

17   system and used by the operating system itself; correct?

18   MR. SCHMIDT: Object to form.

19   THE WITNESS: Could you repeat the question?

20   BY MR. MIRZAIE:

21   Q   Yes.

22   Network Policy Manager was code that was added

23   to the Android operating system itself; correct?

24   A   Yes.

25   Q   Starting in 2011; correct?

                                              Page 229

1   A   Yes.

2   Q   And it could enforce actual policies like the

3   blocking of access requests by third-party developers, to

4   quote your testimony from earlier today.

5   Fair?

6   A   Yes.

7   Q   One other just point of clarification. I think

8   this is just -- I just have my notes wrong. But earlier

9   today when Mr. Schmidt was asking you a related question

10   in the morning, he asked, in the context of background

11   data setting, if a cell phone is on mobile internet, does

12   this code provide certain instructions as it relates to

13   background data.

14   And the answer I have in my notes is: My best

15   understanding of the background data setting is that it

16   is agnostic to the background type.

17   I think you actually said network type; is that

18   correct?

19   MR. YANG: Object to form.

20   MR. SCHMIDT: Same objection.

21   THE WITNESS: Network type is a -- that's a

22   word -- that's an accurate description.

23   BY MR. MIRZAIE:

24   Q   Okay. So your best understanding -- strike

25   that.

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```
 1            So I think the -- my notes on just the realtime

 2    are wrong.

 3            Your best understanding of the background data

 4    setting is that it is agnostic to network type; correct?

 5       A    Yes, that's a correct statement.

 6            MR. MIRZAIE:  Okay.  Thank you.  I have no

 7    further questions.

 8            MR. SCHMIDT:  Okay.  One second.

 9            All right.  We'll pass the witness.  Thank you,

10    again.

11            MR. YANG:  I have a couple more follow-up

12    myself.  It won't be long.  We don't have to go off the

13    record.  I can just get into it.

14            MR. MIRZAIE:  Okay.

15                       EXAMINATION

16    BY MR. YANG:

17       Q    This is Lance Yang, and I have a few questions

18    for you, Mr. Sharkey.  Thank you for your time today.

19            Earlier, do you recall being asked about a 2009

20    presentation where you taught developers how to use the

21    tools in Android to save power in certain conditions?

22            MR. MIRZAIE:  Objection.  Form.  Leading as

23    well.

24            THE WITNESS:  Yes.

25    ///
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```
 1     BY MR. YANG:

 2         Q     Now, how did you come up with the advice and

 3     the recommendations you gave to developers that day?

 4         A     Through close conversations with first-party

 5     app developers at Google.

 6         Q     By "first-party app developers," what do you

 7     mean?

 8         A     So some examples would be the Google Maps team

 9     and the Gmail team.

10         Q     So first-party apps refers to applications that

11     Google itself had designed for the Android operating

12     system; is that correct?

13         A     Yes.

14         Q     Okay.  So by the time of your 2009

15     presentation, had Google applications already been using

16     the best practices that you had presented in that 2009

17     presentation?

18         A     Many of them were, yes.

19               MR. YANG:  Thank you.  No more questions from

20     me.

21               THE VIDEOGRAPHER:  May I go off the record for

22     the day, Counsel?

23               MR. MIRZAIE:  Can we take a one-minute break?

24               THE VIDEOGRAPHER:  Sure thing.

25               MR. MIRZAIE:  I might have some questions.
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 1              THE VIDEOGRAPHER:  Thank you.  We're going off

 2      the record.

 3              This is the end of Media Unit 9.  The time is

 4      4:34 p.m.

 5              (Break held off the record.)

 6              THE VIDEOGRAPHER:  We are on the record.

 7              This is the beginning of Media Unit 10.  The

 8      time is 4:38 p.m.

 9                          EXAMINATION

10      BY MR. MIRZAIE:

11         Q    Okay.  Mr. Sharkey, your counsel asked you a

12      question about, I think, Android apps.  And you

13      referenced, I think, Google Maps; is that right?

14         A    Yes.

15         Q    And did those rely on the hidden API that you

16      referred to earlier today rather than the public one?

17         A    No.  Those applications are limited to, only

18      use public APIs.

19         Q    Okay.  And the Google -- so Google Maps, are

20      you familiar with that app?

21         A    Yes.

22         Q    You didn't work on the code for that,

23      though; correct?

24         A    That's correct.

25         Q    Certain Google apps aren't open
```

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1   source; correct?

2   A   That's correct.

3   Q   Like which ones?

4   MR. YANG: Object to form. Object as beyond

5   the scope.

6   THE WITNESS: I would say there are many Google

7   apps -- Android apps that remain closed source.

8   BY MR. MIRZAIE:

9   Q   Is Google Maps one of them?

10   A   To the best of my knowledge, yes.

11   Q   Now, the recommendations in your IO

12   presentation, we've talked about that throughout the day.

13   Do you recall, you know, that topic?

14   A   Yes.

15   Q   By the way, before I switch to that, Gmail, is

16   that all open source?

17   MR. YANG: Object to form. Object as beyond

18   the scope.

19   THE WITNESS: To the best of my knowledge --

20   BY MR. MIRZAIE:

21   Q   Go ahead.

22   A   To the best of my knowledge, Gmail remains

23   closed source.

24   Q   Thank you.

25   Okay. So back to your -- the recommendations

Page 234

1   you were making to third-party app developers in your IO

2   presentation.

3   Do you recall that topic?

4   A   Actually, if I may pause and return to the

5   previous question. I believe I'm aware that certain

6   parts of the Gmail application were open sourced over

7   time after the Cupcake release.

8   Q   Okay. So before 2011, you're not aware of

9   those apps being open source; correct?

10   A   That's correct.

11   MR. YANG: Object to form. Object as beyond

12   the scope.

13   MR. MIRZAIE: Beyond the scope even though you

14   just asked about those apps?

15   MR. YANG: Whether or not they're open source

16   or closed source doesn't make them within the scope of

17   the deposition topics on which he's designated simply

18   because I asked about the software.

19   MR. MIRZAIE: All right.

20   BY MR. MIRZAIE:

21   Q   So back to the question and the topic I was

22   asking about previously: Your IO presentation that we've

23   been discussing today and the recommendations or best

24   practices that were suggested, do you recall that topic,

25   to third-party app developers?

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1   A   Yes.

2   Q   And your counsel just asked you about

3   first-party app developers using those recommendations.

4   Do you recall that?

5   A   I would summarize by saying those best

6   practices for third-party developers were informed by our

7   experiences in talking with first-party developers.

8   Q   Got it.

9   So is it true -- strike that.

10   I think your answer from earlier today was --

11   let me read the question right before the last break.

12   "So by the time of your 2009 presentation, had

13   Google applications already been using the best practices

14   that you had presented in that 2009 presentation?"

15   Your answer: "Many of them were, yes."

16   So were they using the exact recommendation in

17   your presentation, or was your presentation informed by

18   other recommendations that they were using?

19   Just trying to clarify that.

20   MR. YANG: Sorry.

21   Object to form.

22   THE WITNESS: I would say broadly within

23   Google, these ideas circulated as first practices amongst

24   first-party developers, and then we formalized in sharing

25   them with third-party developers as part of this

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 1    presentation.

 2    BY MR. MIRZAIE:

 3         Q     And part of the best practice was to listen to

 4    the get background data setting; correct?

 5         A     Yes.

 6         Q     And if an app listens to that setting -- I

 7    think according to your testimony earlier today, when an

 8    app is in the background, it would not make an access

 9    request to begin with -- strike that.

10              When the app is in the background, it would

11    know to -- that it shouldn't use the internet service; is

12    that correct?

13         A     Applications would choose to defer work until

14    the user went and manually refreshed an application, as

15    one example.

16         Q     Okay.  So the application would defer the

17    request to use the internet according to the

18    recommendation in the IO presentation; correct?  And your

19    testimony here today; correct?

20         A     Some of the deferrals of first-party apps, that

21    behavior predates the presentation in 2009.

22         Q     Sure.  That wasn't my question.

23              My question was -- well, let me ask this:  The

24    behavior of first-party apps that you discussed with your

25    counsel right before the break, that behavior, just to go
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1   one step further, would be for those apps to defer

2   requests to use the internet services; correct?

3   Do I understand your testimony correctly?

4   A   Deferring is one choice. Because there are

5   many apps, they would each decide how to implement -- how

6   to implement the policy -- the request that the user had

7   made.

8   Q   Are you aware, sitting here today, of other

9   specific choices that were actually implemented? And if

10   so, can you give us the app and the code number, or is

11   that the one you remember sitting here today?

12   MR. YANG: Sorry.

13   Object to form.

14   THE WITNESS: The two that I've mentioned

15   already, Google Maps, Gmail, and I believe also Google

16   Calendar is one that I recall respecting various flags

17   and using -- using these to improve battery life -- using

18   these best practices to improve their battery life.

19   BY MR. MIRZAIE:

20   Q   Again, just to go one step further, the best

21   practices would be, if I understand correctly, to defer

22   making the request to use the internet service

23   activity -- the app would defer making that

24   request; correct?

25   A   In the case of Calendar and Gmail, I believe it

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1   would defer the request until the user went and manually

2   requested a refresh in launching -- in launching the

3   application.

4   Q   Is there some different answer you would give

5   for Maps or something?

6   A   Maps' best practice that I'm aware of relates

7   to a different Bates number in this slide deck that we

8   didn't discuss today.

9   Q   What's that?

10   While you're looking for that, Google Calendar,

11   in 2009, that wasn't -- that also was not entirely open

12   source; correct?

13   MR. YANG: Object to form. Object as beyond

14   the scope.

15   THE WITNESS: I do not recall.

16   BY MR. MIRZAIE:

17   Q   Okay. Back to the slide that you referenced a

18   moment ago for Google Maps.

19   MR. YANG: Bates Number 110.

20   THE WITNESS: Bates Number 110. Okay.

21   BY MR. MIRZAIE:

22   Q   And this is referring to floating-point math?

23   A   That's accurate, yes.

24   Q   Okay. For foreground apps; correct?

25   A   It has no -- no reference -- it doesn't -- the

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```
 1      title of the slide says "Foreground Apps," yes.

 2          Q      And then, "Caching values when doing DPI work

 3      with DisplayMetrics"; right?

 4          A      Correct.  The Maps would just be the first

 5      item.

 6          Q      What's DPI work?  Remind me.

 7          A      DPI is dots per inch.

 8          Q      Okay.

 9          A      It's -- it's related to the resolution of the

10      display -- the screen display.

11              MR. MIRZAIE:  Okay.  I have no further

12      questions.

13              THE VIDEOGRAPHER:  Any other questions,

14      Counsel?

15              MR. SCHMIDT:  Nothing here.

16              We just need to state some confidentiality

17      issues on the record.  I think they are more so for

18      Lance.

19              But no more questions from me.  Thank you,

20      again, Mr. Sharkey, for your time.

21              MR. MIRZAIE:  Thank you, Mr. Sharkey.

22              MR. YANG:  Yeah.  No questions from me either.

23              Let's designate the transcript as confidential,

24      attorneys' eyes only.

25              THE VIDEOGRAPHER:  Thank you.
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1   May I go off the record for the day, then,

2   Counsel?

3   MR. MIRZAIE: Yes.

4   MR. YANG: Yes.

5   MR. SCHMIDT: Yes.

6   THE VIDEOGRAPHER: Thank you.

7   We are off the record at 4:49 p.m. Mountain

8   Time, and this concludes today's testimony given by

9   Jeff Sharkey, a Google corp. rep.

10   The total number of media used was ten and will

11   be retained by Veritext Legal Solutions.

12   (At 4:49 p.m., the deposition of

13   JEFF SHARKEY was adjourned.)

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                                              Page 241

1   DECLARATION UNDER PENALTY OF PERJURY

2

3   I, JEFF SHARKEY, do hereby certify under penalty

4   of perjury that I have reviewed the foregoing transcript

5   of my deposition taken on January 23, 2024; that I have

6   made such corrections as appear noted herein in ink; that

7   my testimony as contained herein, as corrected, is true

8   and correct.

9

10   DATED this _____ day of _____,

11   20_____, at _____, California.

12

13

14

15

16

17   _____

18   JEFF SHARKEY

19

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21

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23

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25

                                             Page 242

REPORTER'S CERTIFICATION

1

2

3   I, Desiree Cooks, Certified Shorthand Reporter in

4   and for the State of California, do hereby certify:

5

6   That the foregoing witness was by me duly sworn;

7   that the deposition was then taken before me at the time

8   and place herein set forth; that the testimony and

9   proceedings were reported stenographically by me and

10   later transcribed into typewriting under my direction;

11   that the foregoing is a true record of the testimony and

12   proceedings taken at that time.

13   Further, that if the foregoing pertains to the

14   original transcript of a deposition in a federal case,

15   before completion of the proceedings, review of the

16   transcript [ ] was [ ] was not requested.

17

18   IN WITNESS WHEREOF, I have subscribed my name on

19   this date: January 31, 2024

20

21

22

23

24

25   Desiree Cooks, CSR No. 14075

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 1    Headwater Research, LLC v. Samsung Electronics Co., Ltd, Et Al.

 2    Jeff Sharkey , Google Corp Rep Job No. 6428176

 3                   E R R A T A   S H E E T

 4    PAGE_____ LINE_____ CHANGE_____

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 6    REASON_____

 7    PAGE_____ LINE_____ CHANGE_____

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21    REASON_____

22

23    _____  _____

24    Jeff Sharkey , Google Corp Rep                    Date

25
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Federal Rules of Civil Procedure

Rule 30

(e) Review By the Witness; Changes.

(1) Review; Statement of Changes. On request by the

deponent or a party before the deposition is

completed, the deponent must be allowed 30 days

after being notified by the officer that the

transcript or recording is available in which:

(A) to review the transcript or recording; and

(B) if there are changes in form or substance, to

sign a statement listing the changes and the

reasons for making them.

(2) Changes Indicated in the Officer's Certificate.

The officer must note in the certificate prescribed

by Rule 30(f)(1) whether a review was requested

and, if so, must attach any changes the deponent

makes during the 30-day period.

DISCLAIMER: THE FOREGOING FEDERAL PROCEDURE RULES

ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY.

THE ABOVE RULES ARE CURRENT AS OF APRIL 1,

2019. PLEASE REFER TO THE APPLICABLE FEDERAL RULES

OF CIVIL PROCEDURE FOR UP-TO-DATE INFORMATION.

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COMPANY CERTIFICATE AND DISCLOSURE STATEMENT

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foregoing transcript is a true, correct and complete

transcript of the colloquies, questions and answers

as submitted by the court reporter. Veritext Legal

Solutions further represents that the attached

exhibits, if any, are true, correct and complete

documents as submitted by the court reporter and/or

attorneys in relation to this deposition and that

the documents were processed in accordance with

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